Vol. XXXVI FEBRUARY, 1926 No. 2

THE LARYNGOSCOPE

AN INTERNATIONAL MONTHLY JOURNAL
DEVOTED TO DISEASES OF THE

EAR - NOSE - THROAT

FOUNDED IN 1894 BY

DR. M. A. GOLDSTEIN.

Managing Editor and Publisher.

For Contents See Page 1.

Subscription, $6.00 per Annum, in Advance.

Foreign Subscription, 35 Shillings per Annum, Post Free.

Single Copies, 75 cents.

PUBLISHED BY THE LARYNGOSCOPE CO.

3858 Westminster Place, St. Louis, Mo., U. S. A.

FOREIGN OFFICE, BAILLIERE, TINDALL & COX,

8 HENRIETTA ST., STRAND, LONDON, ENG.

[Entered at the Postoffice at St. Louis, Mo., as Second Class Matter, in July, 1896.]

THE
LARYNGOSCOPE.

VOL. XXXVI FEBRUARY, 1926 No. 2

ORIGINAL COMMUNICATIONS.

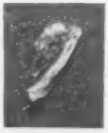
(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

THE PROBLEM OF TRACHEOBRONCHOSCOPY AND ESOPHAGOSCOPY.*

DR. TARO MATSUI, Mukden, Japan.

I. FOREIGN BODIES IN AIR AND FOOD PASSAGES.

A. FOREIGN BODIES IN AIR PASSAGES.



Case 1: H. K., Japanese, male, age 2 years, was brought to the clinic with a history of the sudden occurrence of cyanosis, dyspnea and hoarseness when he was playing three days before. His father said perhaps he had swallowed a fish-bone, because he had had it in his hand.

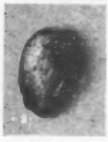
Tracheotomy performed immediately because of severe dyspnea and cyanosis. After tracheotomy, cyanosis and dyspnea disappeared but one ascertained physically that much less aid was entering the right lung than the left. First, the trachea and bronchi were examined with lower tracheobronchoscopy on next day after admission, but they were healthy and the foreign body was not there. After this a temperature of 39° C., but it fell two days after without any other symptoms. Eight days after aspirating it, a fish-bone lodged in subglottis was removed with direct laryngoscopy. Decanulement after a week. Healed.

Editor's Note: This mss. received in The Laryngoscope Office and accepted for publication May 26, 1925.

*The paper read before the Joint Conference of the China Medical Missionary Association and the British Medical Association (Hongkong and China Branch), Jan. 20-28, 1925, Hongkong.

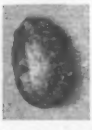
Case 2: N. F., Japanese, female, age 26 years, was admitted to the clinic, complaining of a foreign body in lung. While eating beans in the morning she aspirated a piece in the lung. Severe dyspnea and coughing ensued. Those symptoms disappeared in a short time, but she coughed when she moved her body.

X-rayed, but negative. Examination of chest: right lung was healthy, the entering of air into the left interrupted. Tracheobronchoscoped, with local anesthesia in lying position. I found the foreign body on the bifurcation of the bronchus of upper lobe in left lung and removed it with forceps which was so made that the grasping hooks did not cross each other but had a short space between them so as not to break the bean when grasped. Cured.



Case 3: K. I., Japanese, age 1½ years, male, was brought to the clinic with a history of having aspirated a melon seed four days previous to admission while holding it in his mouth. Severe dyspnea, cyanosis and hoarseness ensued. Local doctor tried to remove with finger. After about ten minutes duration of severe condition it became better and hoarseness disappeared. But one heard a "flap" in the chest when the child coughed.

Examination with X-ray negative. Physical examination of chest: much less air was entering the right lung than the left. Tracheobronchoscoped with general narcosis. Mucus membrane of subglottis and trachea normal. A black body in the entrance on right bronchus was removed with forceps. No reactions. Cured.

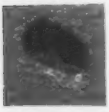


Case 4: S. T., Chinese, age 2⅓ years, female, was admitted to the clinic having aspirated a melon seed thirty-one days before. When aspirated, dyspnea and coughing set in. The child fevered sometimes for a few days duration. When coughing one heard very often a "flap" in the chest of the child.

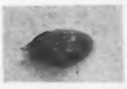
On six days after admission, that is, thirty-seven days after aspiration, a foreign body in right bronchus was removed with upper bronchoscopy with general narcosis. No reactions. Cured.

Case 5: S., Chinese, age 11 years, male, was brought to the clinic with severe dyspnea and cyanosis. The history given was that the boy became suddenly severely dyspneic and cyanotic when eating, probably something had stuck in his throat, making it impossible for him to eat. Because of

asphyxia tracheotomy immediately performed. Five days after admission the foreign body lodged in subglottis was removed with direct laryngoscopy. The foreign body was a claw of a small boiled crab. Decanulement after three days. Healed.

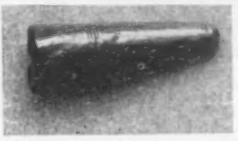


Case 6: Y., Japanese, age 2 years, male was brought hurriedly, having aspirated a piece of boiled bean. When aspirated, severe dyspnea, cyanosis and coughing. On the way to the clinic dyspnea diminished. The patient had stridor. The entering of air was less in right lung than in left. The foreign body in the entrance of right bronchus was removed through upper bronchoscopy with general narcosis. The forceps was so prepared that the two grasping hooks did not cross and a slight space was left so as not to break the soft foreign body when grasping it. Healed with no reactions.



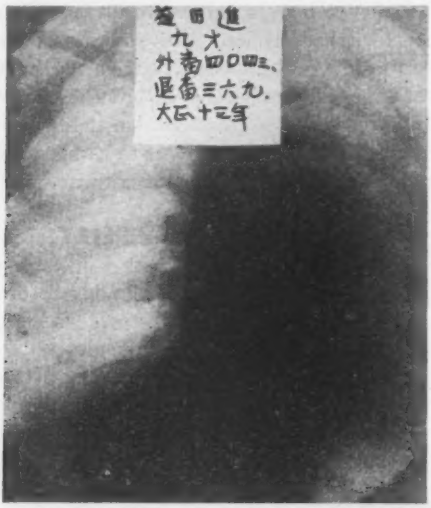
Case 7: R., Chinese, age 7 years, male, was brought to the clinic with a history of having aspirated a jujubee seed the day before. When aspirated, coughing, hoarseness and severe dyspnea ensued and continued in the same condition.

A foreign body lodged in subglottis was removed through direct laryngoscopy. Healed.



Case 8: M. S., Japanese, age 9 years, male, was brought to the clinic with a history of having "swallowed" a metallic pencil ferrule thirty-three days before when playing in the school. When swallowed there was no pain, no dyspnea. So he did not tell about the accident. Three days after temperature rose suddenly to 38-39° C. and patient was admitted to the local hospital. He was treated as for pleuritis. Slightly fevered, every afternoon rising often to 38° C. and more. As he told about the accident he was X-rayed and they found a shadow in chest. They tracheotomized and tried to remove the obstruction, but with no success. He was referred to me on the thirty-second day after the accident. Examination of the chest: no air could enter the left lung except at the top of the lung where one could notice the presence of air, but slightly. X-ray photograph gave a shadow in the left lung and the left lung was dark so that the area of the heart was covered.

The next morning, thirty-third day after the foreign body entering, lower bronchoscopy performed with local anesthesia. The foreign body was impacted in left bronchus about 1:5 c.m. deep from the bifurcation. The mucus membrane inflamed, but no pus. I removed it with forceps turning it for dislodging. After removal the tracheotomy wound was closed. The air entered into the left lung with great vesicular rattling sound which was audible through the patient's mouth. too. Healed.



Remarks: The foreign body had lodged for thirty-three days in the left bronchus and it did not cause abscess or gangrene of lung, but the lung contracted.

Of the above 7 cases, 3 were in the subglottis, 3 in right bronchus, and 2 in left bronchus.

Six cases were under ten years of age.

Two cases were female and six male.

About the duration of lodging the fourth case was the longest one, thirty-seven days in right bronchus.

Foreign bodies in air passage can be classified into two sorts in practice:

1. Mobile foreign bodies which move up and down when the patient coughs and then a sound of "flap" can be heard in the chest.

2. Fast impacted foreign bodies which do not move by coughing but are fast impact on the wall of trachea or bronchus, or penetrate into it.

A mobile foreign body can become immobile and a fast impacted one may become mobile. A mobile one is physically less harmful than the other. It may be coughed out through the mouth or tracheotomy wound. Tracheobronchoscopic removal is also easier in this case. Such foreign bodies as seed or bean belong to the mobile and those like a pin or metallic sharp thing to the immobile, or hurtful.

B. FOREIGN BODIES IN FOOD PASSAGE.

Case 1: Japanese, age 52 years, female, felt as if a bone had lodged in the throat two days before while eating a boiled fish and complained of dysphagia. Asked to locate it, she placed her finger about ½ c.m. below the thyroid cartilage. X-ray negative. A fish-bone, a vertebra with ribs, lodged below the cricoid cartilage was removed esophagoscopically with local anesthesia in sitting position. Healed with no reaction.

Case 2: Japanese, age 35 years, male, complained of dysphagia because of having swallowed his tooth-plate during an attack of epilepsy two days before. He described it as lodged about the level of the top of his chest bone. Immediately esophagoscoped and a plate below the cricoid cartilage was removed, turning its smaller diameter into the axis of the esophagus. Healed without reactions.

Case 3: Japanese, age 30 years, female, had swallowed her tooth plate and complained of dysphagia and pain in turning her head. This occurred when eating at noon on the day of admission. Swallowing absolutely impossible. Immediate esophagoscopy with local anesthesia performed. A plate lodged below the cricoid cartilage was removed by disentangling the edge from the esophageal wall and turning its short axis into the axis of the esophagus, without any trauma. Healed.

Case 4: Japanese age 9 years, male, was brought to us with a history of having swallowed one sen copper coin on that day when holding it in his mouth. Impossible to eat or drink. X-rayed a shadow at the level of third costal.

Esophagoscoped and removed.

Case 5: Japanese, age 3 years, male, swallowed 5 sen nickel coin on that morning when playing. Esophagoscoped and removed foreign body lodged below the cricoid cartilage. Healed.

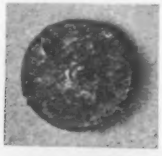
Case 6: Japanese, age 24 years, male, was admitted to the clinic with description of having swallowed his tooth-plate one day before when eating. But he had not complained of dysphagia or pain. He could swallow anything without trouble. Examination with X-ray showed a half moon shaped shadow over the heart. A tooth-plate was esophagoscopically removed and healed.

Case 7: Chinese, age 6 years, male, was brought to the clinic with a history of having swallowed a 5 fun copper coin. Esophagoscoped and removed two foreign bodies lodged below the cricoid cartilage. Healed.

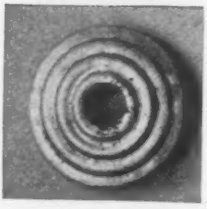
Case 8: Japanese age 5 years, male, swallowed 5 fun Korean copper coin while holding it in his mouth two days before. Esophagoscoped and removed it lodged about at the level of the second constriction, and cured.

Case 9: Japanese, age 31 years, female, swallowed her tooth-plate seven days before in eating. She complained of pain below the cricoid cartilage which was very painful when pressed. X-rayed, a of third costal. Esophagoscoped and removed the foreign body below the cricoid cartilage, disentangling the metallic prong from the shadow was seen about at the level esophageal wall and turning its short axis into the axis of esophagus. Healed without reaction.

Case 10: Chinese, age 28 years, male, swallowed his tooth-plate in eating ten days before. A doctor tried to remove with bougie. This only increased the trouble and it became impossible to swallow. The neck swelled and became very painful on pressing. Another doctor advised to use bougie also. But the poor man had no courage to agree to it. When he came he was very much weakened. X-rayed, a shadow about at the level of third ribs. Esophagoscopic removal. The foreign body, lodged a little below the cricoid cartilage, was surrounded with extensive edema, easily bled by touching. Healed.



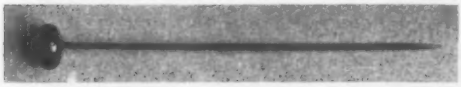
Case 11: Chinese, age 2 years, male, was brought to the clinic with a history of having swallowed a button-fastener for the top of a Chinese cap one day before. The foreign body was found in the hypopharynx entering partly into the esophagus. Removed and cured.



Case 12: Japanese, age 3 years, female, was brought with a history of having swallowed a tin whistle a few hours before. Esophagoscoped and removed.

Case 13: Japanese, age 35 years, male, the day before when sleeping swallowed his plug, which stopped the communication of Antrum Highmore on the upper jaw corresponding to the second molar tooth. Esophagoscoped and removed disentangling from the esophageal wall.

Case 14: Chinese, age 31 years, female, admitted to the clinic with a history of having swallowed her gold ring to commit suicide two days before. The foreign body lodged just below the cricoid cartilage, was removed esophagoscopically. Healed.



Case 15: Chinese, age 6 years, male, was brought to the clinic with a history of having swallowed a pin ten days before. Impossible to eat. Pain about at the level of suprasternal hollow. X-rayed a shadow of a pin with inverted head at the level of fourth ribs. Esophagoscoped and removed a pin 6 c.ms. long stuck in the posterior wall of esophagus. Healed.

Case 16: Japanese age 25 years, male, complained of having swallowed a fish-bone. Asked to locate it, he placed his finger about ½ c.m. below the thyroid cartilage. X-rayed, negative. Esophagoscoped and removed a plate fish-bone lodged below the cricoid cartilage. Healed.

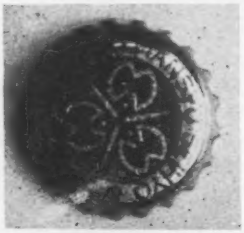
Case 17: Japanese, age 4 years, male, swallowed one sen copper coin that morning when playing. Esophagoscoped without narcosis and removed it lodged below the cricoid cartilage. Healed.

Case 18: Chinese, age 13 years, male, swallowed a 20 fun copper coin two days before when playing. The boy could take liquid food with difficulty. X-rayed, a shadow up the first ribs. Esophagoscoped and removed it. Healed.

Case 19: Chinese, age 6 years, male, swallowed a 10 fun copper coin when playing five days before. Esophagoscoped and removed the foreign body lodged below the cricoid cartilage. Healed.

Case 20: Chinese, age 6 years, male, swallowed a 10 fun copper coin that same morning. No pain but impossible to eat. Esophagoscoped and removed. Healed.

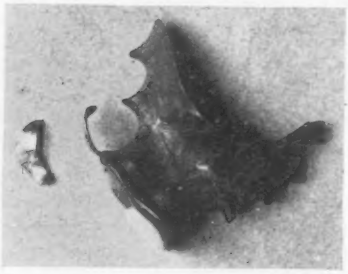
Case 21: Chinese, age 17 years, female, was brought with a history of having swallowed two gold ear-rings to commit suicide one day before. Pain in the neck and dysphagia. Immediately esophagoscoped and removed them lodged just below the cricoid cartilage. Healed.



Case 22: Chinese, age 6 years, male, swallowed a tin stopper of beer bottle five days before. Pain in the neck and dysphagia. The boy was nourished only with liquid food. Esophagoscoped and removed the foreign body lodged below the cricoid cartilage. Healed.

Case 23: Japanese, age 5 years, male, was brought hurriedly with a history of having swallowed a GO-ishi (a piece of Go-play, a Japanese popular plaything). X-rayed, a shadow at the level of first ribs. Esophagoscoped and removed it. Healed.

Case 24: Japanese age 4 years, female, swallowed a white Go-ishi one day before when playing. Impossible to eat. X-rayed, a shadow about at the level of the first ribs. Esophagoscoped and removed it. Healed.



Case 25: Chinese, age 20 years, male, swallowed his tooth-plate seven days before in eating. Local doctor tried to remove with finger and bougie, increasing the trouble. Impossible to swallow after the last manipulation with bougie three days before. X-rayed and a shadow about at the level of third ribs. Esophagoscoped with local anesthesia. Attempts at removal by local doctor were no doubt responsible in a measure for the extensive edema present, which served to make the examination difficult. With difficulty disentangling the upper prong of plate from the edematous partly violet colored mucus membrane of esophagus, and turning the short diameter into the axis of esophagus removed the foreign body. Healed.

Case 26: Chinese, age 5 years, male, swallowed a 10 fun copper coin when playing one day before. Esophagoscoped and removed it. Healed.

About the duration of lodging of the foreign bodies; the longest were cases 11 and 16, each ten days.

Nature of the foreign bodies: Fish-bone, 2 (cases 1, 16); tooth-plate, 6 (cases 2, 3, 6, 9, 10, 25); one sen copper coin, 2 (cases 4, 17); five fun Corean coin, 1 (case 5); five fun Chinese coin, 1 (case 8); ten fun Chinese coin, 3 (cases 19, 20, 26); twenty fun Chinese coin, 1 (case 13); button fastener of Chinese cap, 1 (case 11); tin whistle, 1 (case 12); plug, 1 (case 13); gold ring, 1 (case 14); pin, 1 (case 15); ear-rings, 1 (case 21); stopper of beer bottle, 1 (case 22); Go-ishi, 2 (cases 23, 24); five sen Japanese nickel coin, 1 (case 5).

Location: 23 cases were in upper constriction, one case each in second and third constriction and in entrance of esophagus.

Fourteen cases were under ten years of age, six cases female and seventeen male.

In China there is a superstition that swallowing gold causes death. Such accidents occur often in the case of married women (cases 14, 21).

II. SPONTANEOUS TRACHEAL BLEEDING.

Case 1: K. O., Japanese, age 35 years, male, admitted to the clinic on Jan. 11, 1919, complaining of hemoptysis.

Two months and a half before, he had felt a pain in his chest followed by a bad fit of coughing with some blood in the sputum. After lunch on that day he bled again with coughing. A local doctor was called and he treated the bleeding as from the lung. The bleeding, diminishing in amount, lasted for three days. He kept his bed for one week by the doctor's order. Before the end of one month another similar attack lasted for a few days. On the advice of the doctor he went for a change to the seaside, doing no work whatever. He never had fever. The day before his arrival in Mukden the third attack began to come on.

An under-nourished man with normal heart. The chest was physically healthy. Previous examination of sputum negative of tuberculosis bacillus. Urine normal. Arteriosclerosis could not be found. Wassermann test negative.

Tracheoscoped on the day after admission with local anesthesia preceded by morphin. The mucous membrane of the trachea was a little inflamed and reddened but not remarkable. About at the level of three or four tracheal rings up the carina I saw some dilated blood vessels on the anterior wall of trachea, some of them being covered with blood coagula as the figure shows here. There was no remarkable inflammatory alteration in the location.

I cauterized those blood-vessels with trichloracetic acid carefully. After the manipulation, inhalation was given and heroin ordered.

The bleeding stopped. After five days tracheoscoped again and saw the cauterized part healed, but yet a few dilated blood-vessels were seen which were treated in the same way as before.

After about one year the patient wrote me very contentedly that he has had no bleeding any more and has become very strong and able for his work.

Case 2: Y. G., Japanese, age 40 years, female, consulted me on May 5, 1924, complaining of repeated hemoptysis.

She had had good health. After her last delivery of a boy, six months before, she became delicate. Two months before in the morning feeling something in her chest she suddenly hemoptysed with coughing, not very much in amount. The local doctor treated the bleeding as from the lung, and she kept her bed for a week. There was no fever. The second attack came before twenty days with three days duration. The third bleeding had begun the morning before she came to me.

A little, pale, undernourished woman. Nose and throat were healthy. Examination of the chest practically negative. Tuberculosis bacillus in sputum negative. Urine normal. Wassermann test negative. Arteriosclerosis not found.

Tracheoscoped with local anesthesia preceded by morphin injection. Larynx and subglottis healthy. About at the level of three or four tracheal rings up the carina on the anterior wall of the trachea were found some dilated, twisted blood-vessels. Some of them covered with blood, just the same as I saw in the first case. I treated two times with trichloracetic acid and nitrate silver as in the first case. The attack of bleeding has not returned up to the present time.

In those two cases the repeated hemoptysis was caused certainly by dilated blood-vessels on the anterior wall of trachea about at the level of three or four tracheal rings up the carina. The cauterization of the blood-vessels was sufficient to cure the hemoptysis.

I call them spontaneous tracheal bleeding.

I fear that often such bleeding is mistaken as a bleeding from the lungs as you see in my two cases. And this disease is only diagnosed and treated with tracheoscopy.

Spontaneous tracheal bleeding. Tracheoscopic figure. Dilated blood vessels on the anterior wall of trachea covered with blood-coagula (Case 1).

III. DIFFICULT DECANULEMENT AFTER DIPHTHERIA.

Difficult decanulement after diphtheria is caused very often by granulation tissue or scar in the tracheotomy wound or bending of wall of trachea. Eymeoud[1] and Rogers[2] affirmed that the most frequent cause of difficult decanulement after diphtheria is the chronic swelling of the mucous membrane of the subglottis. But their cases were treated by the intubation of the larynx in the beginning. So it is possible that swelling was caused by the intubation. Thost[3] asserted, that though chronic hypertrophic subglottis is not seldom a complication after diphtheria, many such cases are the fault of intubation used in the beginning. Carrié asserted that there are individual variations of the form of tracheal rings in children. Some of them bend their posterior ends inwards. This bending causes very often difficult decanulement. I had three cases of difficult decanulement after diphtheria examined and treated with tracheoscopy.

Case 1: Japanese, age 4 years, male, was brought to the clinic with a history of failure of decanulement on June 4, 1917.

According to the mother's report the boy was injected with diphtheria serum after being attacked by diphtheria of the throat on Feb. 5, 1917. On that evening asphyxia threatened and tracheotomy was hurriedly performed. The diphtheria being cured, the first decanulement was tried two weeks after the tracheotomy. But the tube could not be withdrawn for threatening asphyxia. After many similar attempts had failed, the boy was obliged to carry the tube.

He was well developed and nourished. The chest showed practically no disease. The boy could easily breathe through the tube. When closed the tube caused severe dyspnea. Examination of the tracheotomy wound showed that the wound corresponded to about

the level of upper tracheotomy and had no remarkable increase of granulation masses.

On June 6, tracheoscoped through the mouth with local anesthesia. The larynx and subglottis were healthy. Inserting the tracheoscope near the tracheal tube, its posterior part was seen, and it was ascertained that granulation masses were coming over the tube from the upper corner of the wound. The tracheal tube was withdrawn and the tracheoscope pushed farther beyond the wound. Now the trachea below the wound came into view and appeared normal. The patient breathed through the tracheoscope. An assistant removed the granulation masses which came out through the tracheotomy wound. Then the wound was closed and the tracheoscope withdrawn. The patient could breathe through the larynx but in the night dyspnea ensued when sleeping. As his mother feared asphyxia, the tube was put in place again.

After four days the decanulement was again performed in the same way. This time it succeeded much better. On the first night his sleep was a little disturbed but on the next there was no disturbance. Cured.

Case 2: Russian, female, age 6 years, came with her mother from Harbin on Jan. 15, 1919, carrying a tracheal tube.

According to mother's description the small girl was tracheotomied because diphtheria caused asphyxia on Oct. 10, 1918 (three months before) in a Russian hospital. After having cured diphtheria with injection, the first decanulement eight days after the tracheotomy was prevented by threatening asphyxia. Intubator used sometimes, but the doctor finally said it must wait till the patient had grown sufficiently to tolerate operative dilatation of trachea.

Well developed and nourished. Chest physically normal. The girl was breathing through a tube which consisted of an exterior one only. The wound, red and infiltrated with granulation masses was situated below the cricoid cartilage.

Six days after admission tracheoscoped by the same way as in the first case. Larynx and subglottis found to be normal. Moving the tracheoscope near the tube, I found granulation masses arising from the anterior wall of the trachea just above the wound, covering the greater part of the tube, of which only a small posterior part was seen when the posterior wall of the trachea was pressed with the tracheoscope. After cocainizing and removing the tube the tracheoscope was introduced deeply beyond the wound. It bled a little. The trachea below the wound was normal and the patient breathed through the tracheoscope. An assistant removed granu-

lation masses in the wound with syringe. The tube was laid in place. After two weeks the second tracheoscopy in the same way was performed. After this the girl could breathe with the tube closed but with difficulty when asleep. After ten days at the third time of tracheoscopy the wound was closed up. Cured.

Case 3: Japanese, age 7 years, male, was admitted to the clinic on Jan. 13, 1923, with a history of having been tracheotomized for diphtheria with asphyxia on Oct. 5 of previous year (three months or more previously). After the diphtheria was cured with serum injection the first decanulement was tried after nineteen days. But being threatened with asphyxia the tube was put again in place, and finally could not be removed.

Fairly developed and nourished. No alterations in chest. Tracheotomy wound which corresponded to about the level of upper tracheotomy was covered with granulation masses. The tube consisted of an exterior one only which was exchanged for a new double one.

Nine days after admission the first tracheoscopy was performed in the same way and granulation masses were found arising from the anterior wall of trachea and covering the greater part of the tube whose posterior part was seen between granulation masses and the swollen posterior wall of the trachea. After removing the tube the tracheoscope was inserted far through the space between the granulation and posterior wall. The lumen of trachea below the wound normal. An assistant removed granulation masses in the wound. After two days again tracheoscoped and closed up the wound. In the night dyspnea ensued and next day the tube was put again in place.

On Feb. 1, lower tracheotomy performed. The old wound closed after ten days. Tracheoscoped and found granulation masses arising from the old wound inside the trachea, and that the posterior wall of trachea was round, swollen and hard. Removed granulation masses through the tracheoscope. After ten days tracheoscoped and still granulation masses were found and the posterior wall of the trachea swollen. Removed masses and painted with silver nitrate. After five days again tracheoscoped. There were no granulation masses. Closed the wound. Cured.

The difficult decanulement of above three cases was caused principally by the increase of granulation masses and the third case by the swelling of posterior wall of trachea also.

Upper tracheotomy had been performed in three cases.

Three cases were treated here by tracheoscopy and cured. In the third case, however, lower tracheotomy was added.

Tracheoscopy and tracheoscopic operations must be preceded by the use of intubators or dilators which easily cause chronic swelling of mucous membrane and need a long time to heal.

In my clinic the tracheoscope is used for the control of decanulement to know the condition of the interior of the trachea.

Dr. Iriyama in my clinic reported one interesting case of a boy who suffered from difficult decanulement which tracheoscopically was diagnosed as due to nervousness.

The boy, age 4 years, was admitted to the clinic on Apr. 10, 1924. According to the mother's description the small boy soon after his birth was treated for forty days for obstruction of the nose and exanthema on the mouth, and cured. From the middle of February his voice became hoarse, followed later by stridor. Fever never high. Local doctor treated as laryngitis but without effect. It grew worse and the voice aphonic, breathing dyspneic with strong stridor. After one week dyspnea ensued and often disturbed his sleeping.

The boy appeared severely ill, with inspiratoric dyspnea and cyanosis on lip. Chest physically healthy. Nose and pharynx normal. Cubital and other lymph glands not swollen. No exanthema on face and body.

As asphyxia threatened, tracheotomy hurriedly performed on next day after admission. Two days later directly laryngoscoped without anesthesia; one ascertained that ventricle cords and posterior wall of the larynx were much inflamed and swollen and vocal cords were covered with white spots. Wassermann test of the boy and mother strongly positive.

Treated antiluetic and laryngoscoped directly after two weeks. It was found that infiltration had almost disappeared, vocal cords were visible. After one week laryngoscoped again and found lumen of larynx to be wide and the infiltrations only a little. The tracheal tube removed, the wound covered with gauze. It caused asphyxia with general cyanosis so that the tube was again put in place. Tracheoscoped on the next day and found there was no remarkable alteration inside the trachea and around the wound, but when the tube was removed, asphyxia ensued.

Dr. Iriyama considered it was caused by nervousness and forbade the approach of doctors and even of nurses, and made his mother cover the tube with gumm bombe. This succeeded but the boy could not speak. One day, however, he spoke suddenly when playing, and made his mother remove the tube. This was successful and he was cured.

IV. PAPILLOMA OF INFERIOR PART OF TRACHEA.

Chinese, age 42 years, male, was admitted to the clinic on July 15, 1919, for a cough of two years duration and often with blood in sputum.

His past history was negative. He never had lues. Wassermann test negative. He had been coughing for two years. Sputum was not much. For one year increased coughing and often sputum mixed with blood, especially after a day of drinking, which caused convulsive coughing. He was treated sometimes for phthysis, sometimes for lues, but without effect. The patient became very nervous.

Well developed but under-nourished. Chest physically healthy. Neither tuberculosis bacillus nor pus in sputum.

Tracheoscoped on June 18 in sitting position with local anesthesia, preceded by morphin. The mucous membrane of trachea normal. Carina sharp and moving freely. At point just upward of anterior corner of carina saw a pedunculated, whitish-yellow growth with papillomatous surface, coming from anterior wall of trachea.

Diagnosing as papilloma, I removed it with a forceps. No bleeding from the wound, painted silver nitrate.

Papilloma of inferior part of trachea. Tracheoscopic figure.

After the operation the patient felt much better as the inside of the trachea was enlarged. Breathing became easier. No more coughing.

After about one year the patient came with gratitude and said to me that he had not had any more coughing and bleeding and was growing fat. The growth is the size of a bean with papillomatous surface showing microscopically a papilloma as here demonstrated.

A STUDY OF LATERAL SINUS THROMBOSIS, WITH REPORT OF CASES.*

DR. JOSEPH WARREN WHITE, Norfolk, Va.

A diagnosis and the correct method of procedure after a diagnosis has been established in lateral sinus thrombosis makes this one of the most distressing complications of mastoiditis. It is a complication not so rare that it may not always be a possibility and keeps the otologist ever on the alert, more especially in those cases that do not run an uneventful course. Although the literature on this subject has been quite extensive, it may not be amiss to present in detail a series of six cases occurring in my own practice.

The fifty-first annual report of the Manhattan Eye, Ear and Throat Hospital gives a series of 566 cases of acute and 22 of chronic mastoiditis with only 11 cases of sinus thrombosis. Welty reports 3 cases of lateral sinus thrombosis out of a series of 100 cases of acute mastoiditis. Day reports a series of 45 cases of sinus thrombosis and a spontaneous cure of 6 of these cases. They were not previously suspected, but were accidently discovered during the operation. To quote, "It is the third group in which the clot becomes organized with obliteration of the sinus that I wish to call special attention. Of these we have found 6 cases in which the diagnosis made on the operating table was not previously suspected. How many have been passed by unrecognized will never be known."

As to the etiology of sinus thrombosis, Kerrison writes as follows: "Probably changes in the individual powers of resistance to disease furnish the determining factor in many cases. There can be no doubt, for example, that children suffering from suppurative middle ear lesions complicating the acute infectious disease more frequently develop intrasinus infection than do children who have not been subject to such severe systemic depletion. A very large percentage of the cases of infective sinus thrombosis which have come under the personal care of the writer have been among patients whose aural lesions have occurred either as a complication or a sequella of severe constitutional diseases. The character of the infection is also a most important etiological factor in purulent sinus phlebitis."

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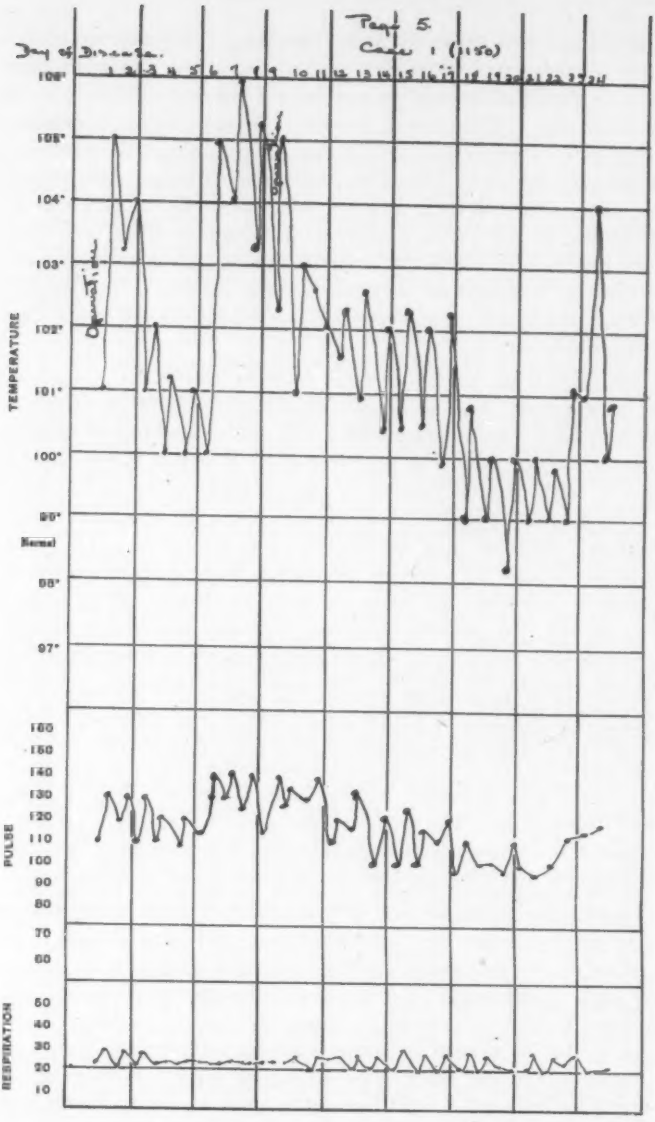
*Candidate's Thesis for the American Laryngological, Rhinological and Otological Society, Incorporated.

Editor's Note: This mss. received in The Laryngoscope Office and accepted for publication Sept. 17, 1925.

The underlying cause of sinus thrombosis frequently assigned is either the delayed or incomplete mastoid operation. However, many cases of perisinus abscess do not cause intrasinus infection, as we have all seen. There must, however, be some other determining factor as to whether pus shall remain circumscribed or whether it shall invade the sinus. Intrasinus infections follow mastoidectomies that are performed early and complete, as all of us have had the misfortune to see. It is somewhat of a rare condition for lateral sinus infection to follow an acute or chronic purulent otitis media without an intermediate infection of the mastoid cells, although McKernon and others have reported a primary infection of the jugular bulb and sinus.

The clinical picture of sinus thrombosis, caused by a discharge of septic matter into the general circulation is quite characteristic. We may have a typical case with a chill and sudden rise of temperature of several degrees to be followed by a return to normal, and then at fairly regular intervals a rise of temperature and a remission to normal or a little above normal. Yet the absence of every diagnostic symptom does not exclude sinus thrombosis. There may be a disturbance of cerebral circulation with a severe headache, nausea or vomiting, and again this may be absent. Many authors have spoken of a cord-like thickening over the internal jugular, disclosed by deep palpitation; but the physical signs of sinus thrombosis are not constant or reliable. The pulse rate, however, is usually high unless there is an increase in intracranial pressure. In a typical case the diagnosis is very easy when all the symptoms are present, and in no branch of surgery are experience and judgment guided by clinical and laboratory findings more important than in lateral sinus thrombosis. The number of cases that recover without a diagnosis is, fortunately, far greater than was thought at one time. Day reports that 13½ per cent of his cases healed spontaneously.

Bacteremia by its absence does not exclude sinus thrombosis or by its presence make the diagnosis certain. Duel and Wright report a series of 57 cases and a positive bacteremia found in 16. Kerrison says, "Bacteremia is a usual accompaniment of septic endocarditis; it may be present in pneumonia and in purulent meningitis, it may be present in severe tonsillar infection; it occurs not infrequently in the septic type of scarlet fever. It may be, according to Duel and Wright, present in cases of uncomplicated mastoiditis." The leucocytosis is lower than in other forms of sepsis. Crockett says that the number of white cells do not usually exceed 20,000 and that this is a characteristic feature of sinus thrombosis.


Page 5.
Case 1 (1150)
Day of Disease.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
TEMPERATURE
106°
105°
104°
103°
102°
101°
100°
99°
Normal
98°
97°
PULSE
160
150
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120
110
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90
80
70
60
RESPIRATION
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40
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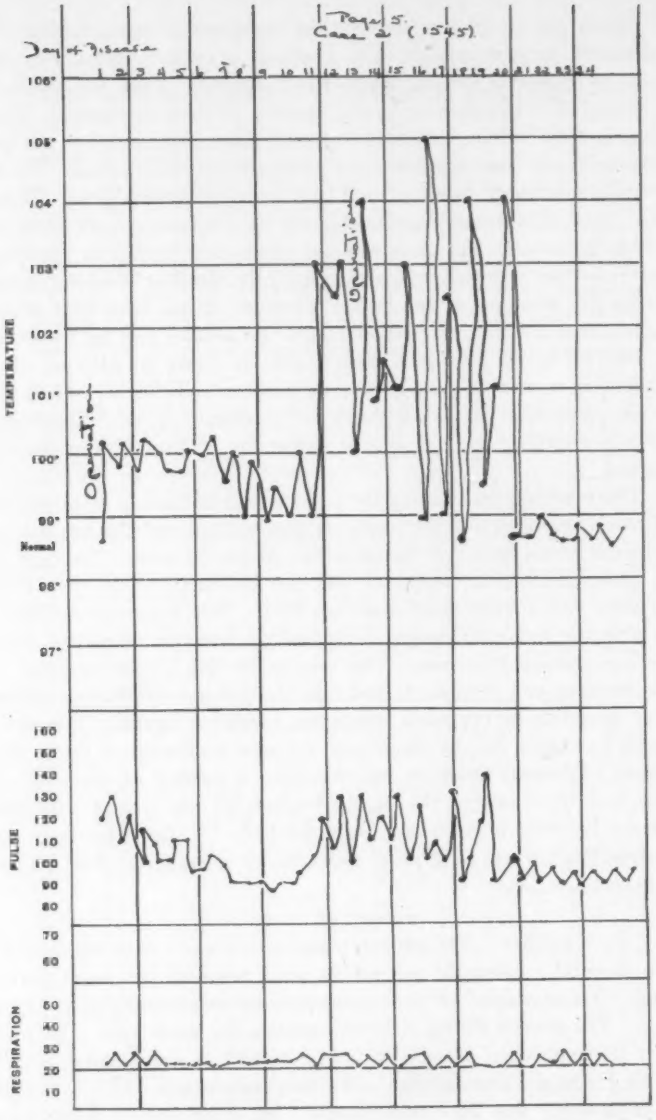
There can be no question that the treatment of sinus thrombosis is purely surgical as soon as a diagnosis is made. Zaufal was the first to suggest a surgical method of treatment. Lane was the first successfully to apply a surgical treatment of sinus thrombosis. This was in 1899. Since this time otologists have endeavored to perfect themselves in the diagnosis and treatment of the disease. Those equally prominent, however, still hold widely divergent views. There are those who favor jugular ligation or resection in all cases of sinus thrombosis, and those who are opposed to ligation or resection except when a demonstrable clot and free bleeding does not occur from the direction of the bulb. However, it has been well established that a delay does not endanger the patient and before being submitted to an operation, time should be taken in arriving at a diagnosis, as it is so easy to become anxious and operate before we have given time for development of symptoms. Case A illustrates how erysipelas may give typical symptoms of lateral sinus thrombosis.

There is a division among the otologists as to ligation or resection. From a study of the literature on this subject and the reports of cases, it would seem that the results are about the same. The ligation is more simple than resection, and can be done quickly with little trauma and a very small scar resulting. But whatever operative course we decide to pursue, a ligation or resection should be done before opening the sinus. The reason for this is that portions of an infected clot may be forced into the general circulation during any operation on the sinus, unless the jugular is ligated. The operative procedure on the sinus used by most authorities is about the same. Friesner, however, has described a method of approach to the bulb by removing the jugular process of the occiput. By this means he seeks to open and drain the bulb. In the series here reported ligation was done in all cases before opening the sinus except in Case 6.

REPORT OF CASES.

Case 1 (1150): The patient, male, age 11 years, was admitted to the hospital. Adenoids and tonsils were removed two years previous. One year ago he had an acute purulent otitis media in the right ear. The present illness followed measles one week ago. The first day he complained of pain in both ears and an examination found both drums red and bulging. His temperature was 99°. A double myringotomy was done immediately. He continued to suffer pain in right ear with a profuse purulent discharge. A culture from the ear taken before admission to the hospital showed a streptococcus


Page 5
Case 2 (1545)
Day of Disease
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
106°
105°
104°
103°
102°
101°
100°
99°
Normal
98°
97°
TEMPERATURE
Operation
Operation
160
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140
130
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70
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PULSE
50
40
30
20
10
RESPIRATION

infection. Forty-eight hours after he first complained of pain in his ears he was admitted to the hospital. The examination showed edema over right mastoid and mastoid tenderness. In addition to the profuse aural discharge, there was a sagging of the postero-superior canal wall. A very slight discharge from left ear with no mastoid tenderness. He complained all the time of pain in right ear and with a history of sleeping very little the night before.

X-ray report: Left mastoid normal. Right mastoid is definitely diseased, the integrity of the cells being lost and the entire mastoid area hazy as compared to left.

Operative report: Simple mastoidectomy, right. All cells filled with pus. Sinus and dura are exposed.

Uneventful course until sixth day.

Sixth day: Rise of temperature. More profuse discharge from the left ear, and very restless.

Seventh day: Discharge from left ear slightly increased. No mastoid tenderness.

X-ray report of left mastoid: Integrity of all cells is maintained and there is no clouding of consequence.

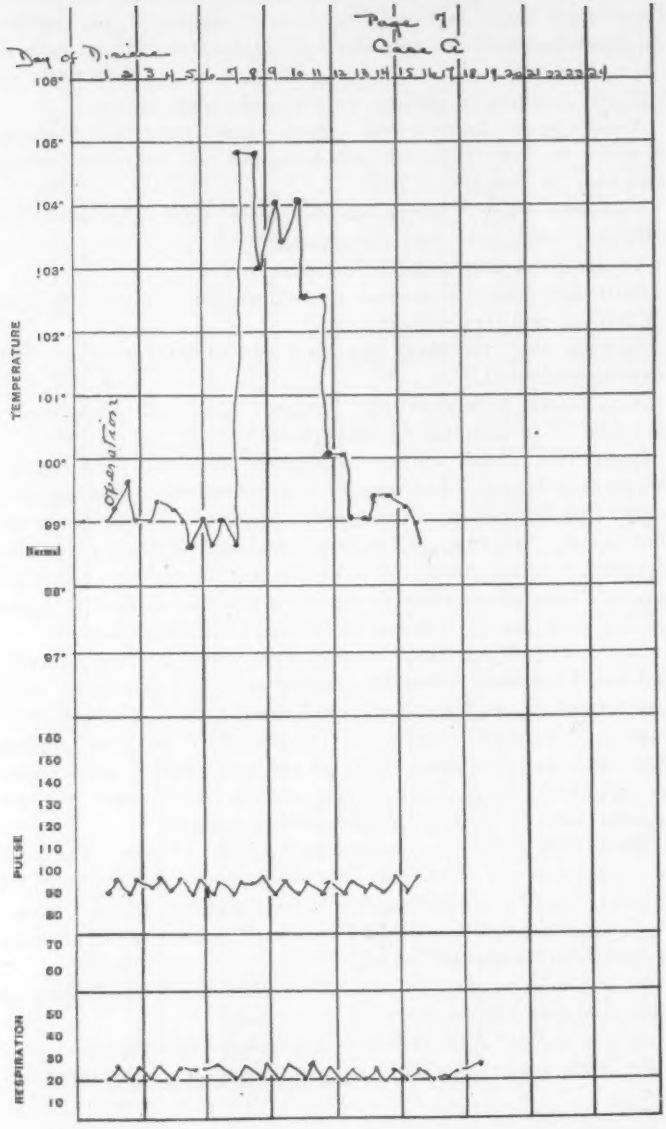
Eighth day: Report of internist: Heart action rapid and regular. No murmur at apex. Left apex of lung behind shows slight impairment of percussion note as compared to right and breath sounds are interrupted. Few fine rales in deep breathing. Nothing of definite significance in the lungs. No definite cervical rigidity. Kernig's symptom is negative, although there is a tendency to flex the opposite leg when one leg is flexed on hip and extended at knee.

Ninth day: Three blood cultures were taken at different times and found negative. White blood count 15,000. Differential: Polymorphonuclears, 81.5 per cent; small mononuclears, 10.5 per cent: large mononculears, 6 per cent; transitional, 2 per cent. Spinal fluid clear, normal tension. Cells 45 per m.m. Direct smear shows no organism. Sugar shows 48 m.g. per 100 c.c. of fluid. Culture negative after 72 hours. Eye grounds are negative.

The clinical picture has changed in the past 12 hours. The mental condition is one of extreme restlessness and irritability, delirious at times. There is a slight rigidity of the muscles of the neck. Kernig's symptom is positive to some extent. There is nothing unusual to note about the mastoid wound.

At 10 a. m. a consultation was held and the unanimous decision of the consultants was no operative interference.

At 1 p. m. the nurse reported that the patient complained of a slight chilly sensation with a rise of temperature. Another con-


Page 7
Case Q
Day of Disease
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
TEMPERATURE
106°
105°
104°
103°
102°
101°
100°
99°
Normal
98°
97°
Operation
PULSE
180
160
140
130
120
110
100
90
80
70
60
RESPIRATION
50
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sultation was held and it was decided to explore the lateral sinus.

Operative report: Jugular ligated and then the sinus was well exposed backward to the torcular. The approach to the bulb was further enlarged by removing the jugular process of the occiput after the method of Friesner so that the jugular bulb could be opened and drained. A large necrotic area on the sinus. When the sinus was opened, organized clots from sinus and bulb were removed. The necrotic wall of sinus was removed.

After 21 more days in the hospital, the patient was discharged.

Case 2 (1545): First day: The patient, female, age 11 years, was admitted to the hospital. She had pain in right ear six days before a physician was called. The examination showed considerable tenderness over mastoid and the drum red and bulging. A free myringotomy was done. The next day the aural discharge was very profuse, and she continued to suffer pain. At this time considerable edema had developed over mastoid and the mastoid tenderness had increased. Her adenoids and tonsils had not been removed.

Examination: A profuse aural discharge, edema and tenderness over mastoid. Pain in the ear had increased since the myringotomy.

Operative report: Right simple mastoidectomy was done. The cells were broken down and free pus was present. Sinus and dura were exposed.

Uneventful course until the eighth day.

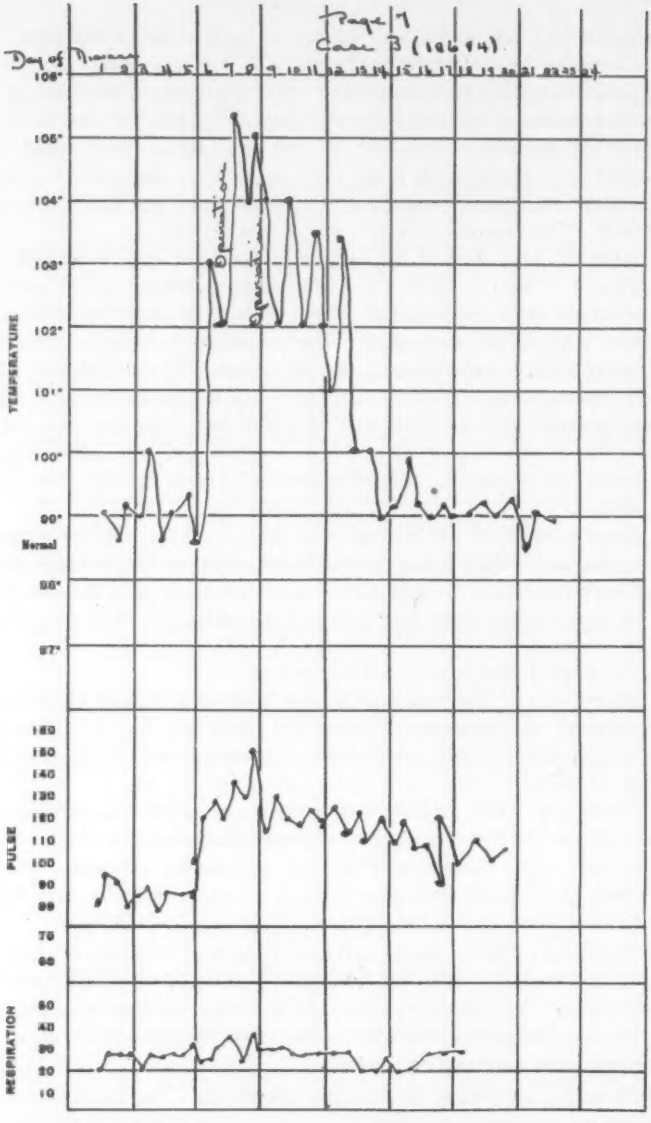
Eighth day: She was out on the lawn in a rolling chair, but complained of headache. During the night she had a chill that lasted 10 minutes, and complained of headache and severe pain in back of neck.

Ninth day: The mastoid was dressed and there was nothing to note except the usual amount of drainage that would be expected at this time. She looked very ill and profoundly shocked. Complained of headache and pain in back of neck the entire day and slept very little during the night.

Tenth day: The headache and pain in back of neck did not let up from the time she first had her chill. White blood count 18,200. Differential: polymorphonuclears, 89 per cent; small mononuclears, 7 per cent; large mononuclears, 4 per cent. Blood culture showed streptococcus mucosus capsulatus.

Operation performed under ether anesthesia. The ligation of internal jugular vein and drainage of sinus. No obliterating thrombus was disclosed.

After a long stay in the hospital, she recovered.


Page 9
Case B (1864)
Day of Illness
TEMPERATURE
Normal
PULSE
RESPIRATION
Operation
Operation

Case A: First day: A physician, age 35 years, was admitted to the hospital with an acute mastoiditis on the left side, which followed an acute purulent otitis media of six weeks standing.

A simple mastoidectomy was performed. Neither sinus nor dura were exposed.

Uneventful course until the sixth day.

Sixth day: While out on the lawn he had a severe chill, which lasted two hours.

Seventh day: He looked very sick, uncomfortable, restless and complained of headache. There was nothing unusual to note about the mastoid wound. A consultation was held and some were of the opinion that the sinus should be opened. Blood culture was negative. White blood count was 25,000. A high leucocytosis, low pulse rate and negative blood culture were the reasons for not opening the sinus.

Eighth day: Erysipelas developed.

Case 3 (18684): First day: The patient, female, age 16 years, gave a history of pain in left ear for three days. The left drum was found red and bulging. A myringotomy was done. A free discharge of blood and pus.

Second day: Considerable mastoid tenderness and profuse aural discharge, but complete relief from pain.

X-ray report: Left mastoid normal.

Third day: Very slight edema over tip of mastoid and mastoid tenderness, but relief from pain. White blood count was 9,000. Polymorphonuclears, 71 per cent.

X-ray report (a second examination): Left mastoid normal. Operation was advised.

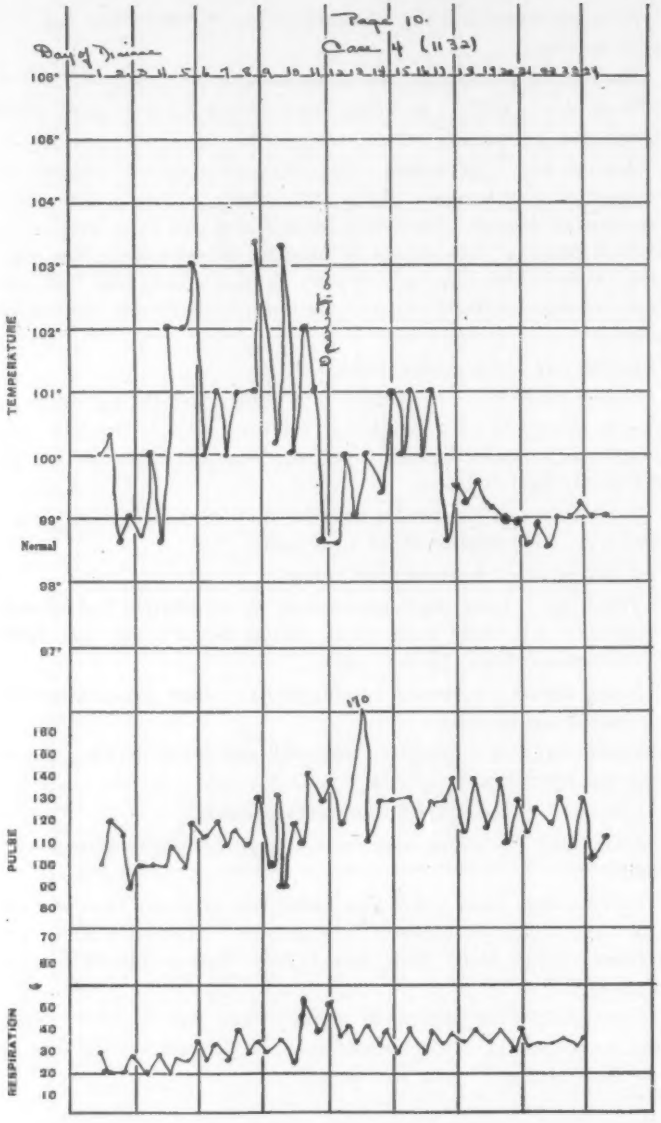
Fourth day: A consultation was held, and it was decided to postpone the operation.

Fifth day: Patient bright and feeling better.

Sixth day: No edema over mastoid, and mastoid tenderness very slight.

Seventh day: Had a chill and complained of severe headache and pain over region of mastoid. Examination: Marked mastoid tenderness. White blood count was 21,600. Polymorphonuclears, 89 per cent.

Operation: Free pus found in tip. Dura was exposed. Sinus was not exposed. After consultation, at the time of operation, it was decided not to open the sinus.


Page 10.
Case 4 (1132)
Day of Illness
TEMPERATURE
Operation
Normal
PULSE
170
RESPIRATION

Eighth day: Very restless, and the pain was less severe. Blood culture was positive, showing a pnuemococcus growth. Culture from mastoid wound showed a pneumococcus infection. Operation: The ligation of internal jugular and drainage of sinus, we found no obliterating pus. The patient continued to be restless and delirious at times.

On the tenth day she developed a cough, pain in the right side of chest and was expectorating a bloody sputum.

Report of internist: Marked consolidation of lower lobe, right side.

Impression: Pulmonary metastasis secondary to lateral sinus thrombosis.

Eleventh day: 30 c.c. of 1 per cent mercurochome intravenously.

Thirteenth day: 20 c.c. of 1 per cent mercurochome intravenously.

Bloody expectoration continued until the seventeenth day. After a long illness she recovered.

Case 4 (1132): First day: The patient, female, age 10 years, had a slight pain in right ear for several days following an acute cold before she was seen by a physician. Three days before admission to the hospital a myringotomy was done.

Aural examination showed rather a profuse discharge from right ear but no sagging of the posterosuperior canal wall. Slight tenderness over mastoid on pressure.

The progress notes state that she complains of no pain and is comfortable. There is still some aural discharge.

Sixth day: She is very restless and coughing.

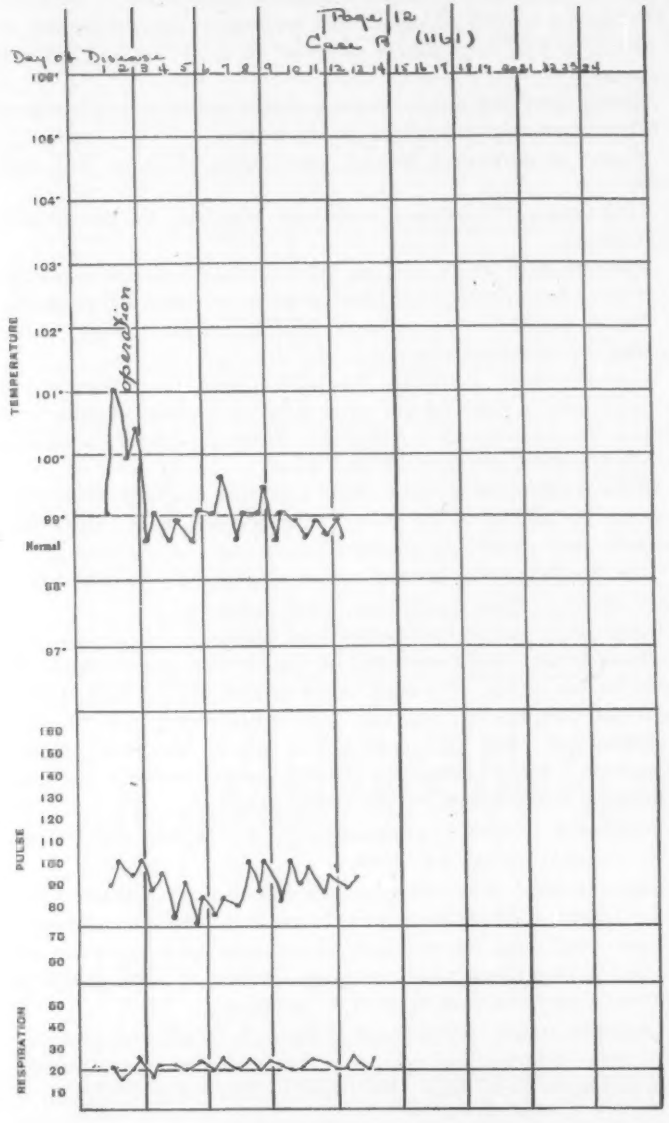
Seventh day: She complained of considerable pain in chest and right lumbar region. The night of the seventh day she slept at short intervals, very restless, coughing and complaining of pain in chest.

Eighth day. She still complained of pain in chest and coughing frequently. Aural examination showed a slight discharge and some tenderness over mastoid on pressure.

Ninth day: Report on examination of chest by internist is negative. A blood culture was taken.

Eleventh day: The blood culture was negative. White blood count 16,600; polymorphonuclears, 72 per cent; small mononuclears, 26 per cent; large mononuclears, 2 per cent. Culture from ear showed a staphylococcus aureus. An increase in aural discharge. Marked tenderness over mastoid on pressure.

Operative report. Mastoid cells broken down and free pus present. Sinus indurated and necrotic. The ligation of internal jugular vein and drainage of sinus. We found no obliterating thrombus.


Page 12
Case R (1161)
Day of Disease
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
TEMPERATURE
106°
105°
104°
103°
102°
101°
100°
99°
Normal
98°
97°
Operation
PULSE
180
170
160
150
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RESPIRATION
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The progress notes state that she improved from this time and on the thirtieth day she would have been discharged, but living conditions were not good at her home, so the hospital allowed her to remain. She would help by working in the wards.

Forty-fourth day: She complained of headache, and unable to get out of bed.

Forty-fifth day: She still complained of headache.

Forty-sixth and forty-seventh day: She complained of headache and nausea. Vomited a great many times.

Forty-eighth day: She had a convulsion. Alumbar puncture was done and the spinal fluid was cloudy. Culture from spinal fluid showed a staphylococcus growth. The eye grounds were negative. The mastoid wound had completely healed. Very restless, complaining of headache and delirious.

She died on the fourth day of her last illness. No autopsy was obtained.

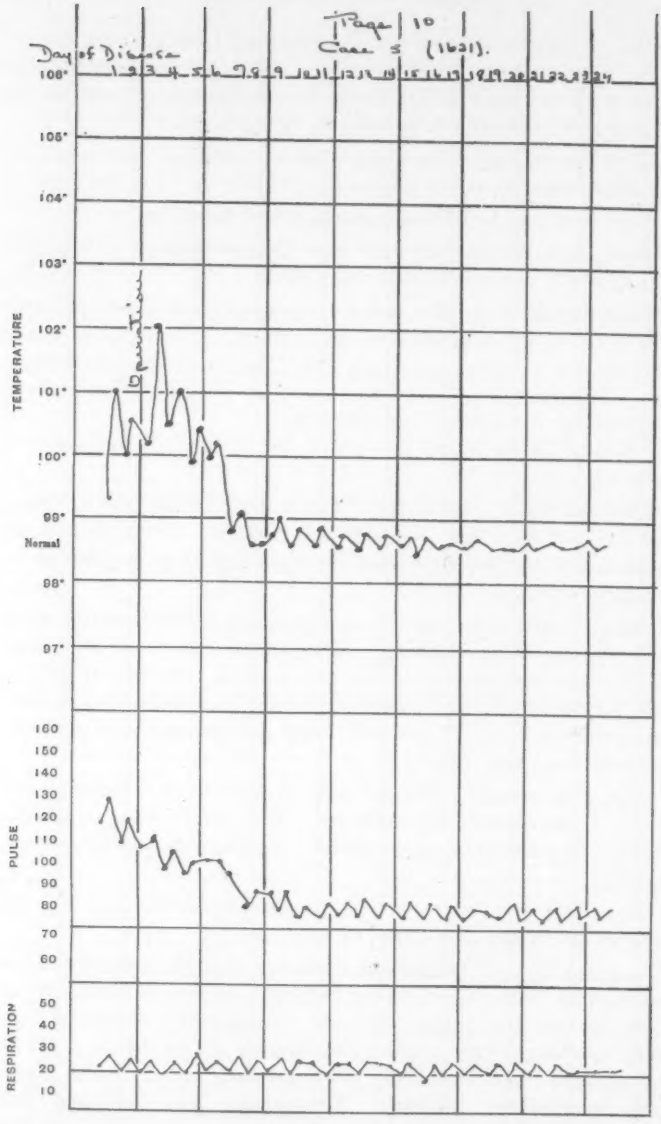
Case 5 (1621): First day: The patient, female, age 11 years, had pain and discharge from right ear ten days. Three days before admission to hospital a free myringotomy was done because of incomplete drainage.

Aural examination showed a sagging of posterosuperior canal wall with a profuse discharge. Considerable edema and tenderness on pressure over mastoid. She continued to complain of pain in ear. White blood count 12,600; polymorphonuclears, 66 per cent; small mononuclears, 15 per cent; large mononuclears, 18 per cent; eosinophiles, 1 per cent.

Operative report: Mastoid cells broken down. Perisinus abscess. Sinus necrotic and indurated. The usual ligation of internal jugular vein and drainage of sinus. No obliterating thrombus was found.

The progress notes state that she improved daily and was discharged on twenty-first day.

Case 6 (1096): The patient, male, age 47 years, was admitted to the hospital with the following history. He had a slight pain in right ear two days before admission. Examination showed a slight aural discharge with considerable bulging of the drum. A free myringotomy was done under gas anesthesia, and there was a profuse seropurulent discharge. Temperature was 101° and then fluctuated between normal and 100° until the seventh day and then remained normal, except occasionally 99°, until the twelfth day. Three X-ray pictures were taken of the mastoid at different times,


Page 10
Case 5 (1631).
Day of Disease
TEMPERATURE
PULSE
RESPIRATION
Normal

and they were all negative. He complained of no pain in the ear, except at times there was a darting pain and instantly disappeared.

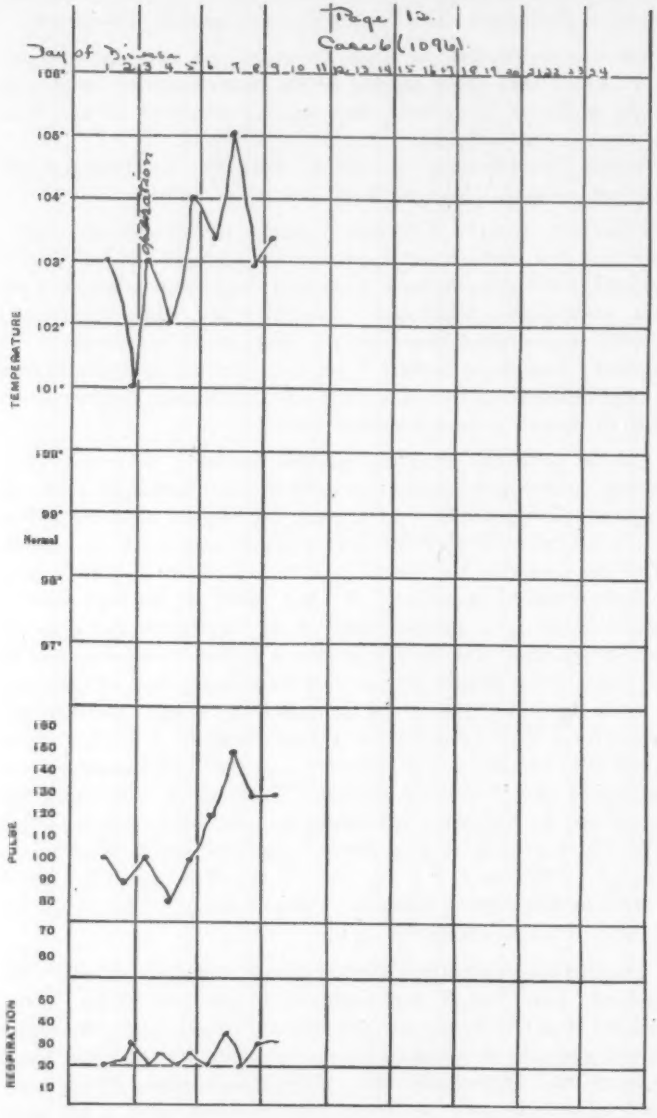
On the twelfth day the aural discharge was more profuse and there was a very slight sagging of the posterosuperior canal wall. Slight tenderness on pressure over mastoid with some edema. Pain at times during the night.

Simple mastoidectomy was done. Findings: Hemorrhagic and purulent mastoid. Necrotic bone over sinus and dura.

Laboratory report: Urinalysis negative for albumin and sugar. The first day white blood count, 24,000; polymorphonuclears, 80 per cent; small mononuclears, 8 per cent; large mononuclears, 9 per cent; eosinophiles, 1 per cent. The third day, white blood count 22,000; polymorphonuclears, 80 per cent; small mononuclears, 14 per cent; large mononuclears, 4 per cent. Culture from ear at time of myringotomy showed a staphyloccoccus aureus. Culture from mastoid showed a staphylococcus aureus.

On the sixth day after the mastoid operation, the temperature became normal and remained so until he was discharged from the hospital. He remained in the hospital four weeks after the operation was done, as he preferred this to going to the hotel. Six weeks after the operation the wound had almost closed and he was in splendid physical condition. He had made all arrangements to leave the city on a business trip. I was notified to come to the hotel to see him. The history he gave was that during the night he had considerable pain in ear and that there was a profuse discharge from the ear. The pain in the ear ceased in the early morning and except for a slight headache, he was comfortable. I saw him again in the afternoon and his temperature was 103° and examination of the wound showed nothing unusual. There was a slight aural discharge and he continued with headache. He was, however, bright and took it as quite a joke when I suggested his removal to the hospital. This was at 5 p. m. At 9 p. m. on the same day at the hospital he was slightly delirious. The next day at 8:30 a. m., 15 c.c. of spinal fluid was removed.

Examination: Cell count 21,000; globulin strongly positive. Differential count: small mononuclears, 16 per cent; large mononuclears, 4 per cent; polymorphonuclears, 70 per cent. A culture showed a growth of streptococcus mucosus capsulatus. White blood count 18,400. Differential count: polymorphonuclears, 90 per cent; small mononuclears, 6 per cent; large mononuclears, 1 per cent. Blood culture was negative.


Page 12.
Case 6 (1096).
Day of Disease
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Operation
TEMPERATURE
106°
105°
104°
103°
102°
101°
100°
99°
Normal
98°
97°
PULSE
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RESPIRATION
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At this time he was apathetic, pupillary reaction slow, definite rigidity of neck muscles. Positive Kernig. Eye grounds negative. Very restless.

It was decided after consultation to open the wound. The dura was opened, and then the sinus was exposed and opened. There was no bleeding from the jugular end of the sinus but free bleeding from above. On account of the condition of the patient one of the consultants objected to ligating the internal jugular, so the clot was undisturbed. The wound was packed.

Treatment: Second day: 8:30 a. m., 15 c.c. of spinal fluid removed. 12 p. m., 30 c.c. of spinal fluid was removed.

Third day: 8 p. m., 10 c.c. of 1 per cent solution mercurochome intravenously; 25 c.c. of spinal fluid was removed. 11 p. m., 10 c.c. of 1 per cent solution mercurochome intravenously.

Fourth day: 10 a. m., 30 c.c. of 1 per cent solution mercurochome intravenously. 11 p. m., 30 c.c. of 1 per cent solution mercurochome intravenously.

He began to have convulsions during the last 24 hours and they became more frequent until death. Twelve hours after the first mercurochome was given there was an improvement in his general condition. The pulse rate and temperature came down for a short time. Twenty-four hours after the mercurochome was given the chemical test of the spinal fluid for mercury was positive.

Case B (1161): First day: The patient, male, age 14 years, complained of pain in right ear two days before a physician was called. Examination showed the drum red and bulging. A free myringotomy was done and there was profuse seropurulent discharge. He complained of no more pain for 48 hours and then the pain becoming more severe, he was admitted to the hospital.

Examination at this time showed a sagging of posterosuperior canal wall. Tenderness on pressure over mastoid.

X-ray positive for a diffuse mastoiditis.

One year ago he had acute purulent otitis media in both ears. Adenoids and tonsils were not removed.

Operative report: Simple mastoidectomy right. Extensive mastoid with free pus. Neither sinus nor dura were exposed.

Second day: He was very restless, and slightly delirious. White blood count 22,000; polymorphonuclears, 80 per cent. Culture from mastoid showed a growth of staphylococcus albus. Blood culture positive and showed staphylococcus albus.

Third day: He was more quiet:

Fourth day: His condition had improved and from this time on he rapidly improved until his discharge from the hospital fourteen days after admission. Although this case had a positive blood culture, there was evidently no intrasinus infection.

A careful review of these cases will show that a lowered resistance caused by some other disease or by a neglected myringotomy is a contributory cause of intrasinus involvement. Likewise, as has been pointed out by Kerrison, a lowered resistance plays an important role. Case 1 was considerably worn down by measles and, besides was anything but a robust child. Case 2 had a pain in the right ear six days before a physician was called and the drum had not ruptured. Case 3 had headaches and pain in left ear for three days before an aural examination was made. Case 4 had an acute cold for several days before being seen by a physician. Case 5 had a purulent discharge from the right ear and pain one week before being seen by an otologist. Case 6 had pain in the right ear two days before an aural examination was made.

The delay in the mastoid operation is not so important as the delay in an early myringotomy. The delay can only be prevented by frequent aural examinations in all cases and especially in children, as they so frequently do not complain of any pain in the ear. A mastoid operation was performed in Case 1 48 hours after he first complained of pain in the ear. Doubtless there was an involvement of the middle ear some time before he complained of pain. Cases 4 and 6 complained of severe headache. Both Cases 4 and 6 developed meningitis. Case 3 was the only one that had a metastasis. The sinus was exposed in Cases 1, 2 and 6, but no perisinus abscess was found. In Cases 4 and 6 the sinus was necrotic with a perisinus abscess. In Case 3 the sinus was not exposed.

A culture from the mastoid at the time of operation showed a staphylococcus growth in Cases 4 and 6, a streptococcus growth in Case 1, a streptococcus mucosus capsulatus in Case 2, and a pneumococcus growth in Case 3. No culture was made in Case 5. So it appears that intrasinus involvement is not limited to any particular character of infection. The blood culture was negative in Cases 1, 4 and 6, and positive in Cases 2 and 3. Case 2 showed a streptococcus mucosus capsulatus, and Case 3 showed a pneumococcus. Case B gave a positive blood culture with a staphylococcus albus. The leucocytes numbered under 19,000 in all cases except in Case 3, which numbered 21,600, and Case 3 developed a pulmonary metastasis.

From a review of these cases it can be stated that the temperature is not characteristic, but varies greatly, and is of no definite type. In Cases 2 and 3 there was a distinct chill with a sudden rise of temperature, but neither case was followed by a remission to normal or just above normal. Nor are physical signs constant. In the cases reported there was no tenderness or cord-like thickening found by palpation over the internal jugular. Neither was there noted any blurring of the disc margins of the fundi or any other ocular changes.

To summarize: Of the six cases in this series there were only two with a distinct chill and sudden rise of temperature. In no case did the temperature fall rapidly to the normal line or slightly above it. None of the cases showed any localizing signs in the neck. Five of these cases showed a leucocytosis under 19,000. Only two cases gave a positive blood culture. No ocular changes were noticed in any of these cases. Metastasis developed in only one case. The pulse rate varied from 110 to 140 in all but one case. In going over the histories, Cases 2 and 3 are the only ones in which a diagnosis could be made with any degree of assurance. Cases 1 and 6 were exploratory. Cases 4 and 5 were accidently discovered. In reviewing Cases 4 and 6 we are impressed with the great similarity. Six weeks after their mastoid operation each one complained of headache first. Case 4 had the sinus opened and the internal jugular ligated at the time of the mastoid operation. Case 6 did not have the sinus opened until six weeks after the mastoid operation. Both cases developed meningitis, although their surgical treatment was entirely different. Doubtless Case 6 had a sinus thrombosis at the time of the original mastoid operation which was not recognized.

CONCLUSIONS.

1. Typical clinical symptoms caused by a discharge, at fairly regular intervals, of septic matter into the general circulation (and usually in these cases a positive blood culture is obtainable), do not occur in the greater number of cases of lateral sinus thrombosis.

2. Even in those cases with typical clinical symptoms, we must delay submitting the patient to an operation until a thorough investigation has been made as to some other causes than the ear condition.

3. The temperature of sinus infection is of no definite type, is not characteristic, but varies greatly.

4. A high pulse rate and a comparatively low leucocyte count is the usual thing.

5. In the greater number of cases a definite diagnosis from the clinical symptoms and laboratory findings is very difficult. In no branch of surgery does experience and judgment count for more.

6. Early and complete mastoid operations do not seem entirely to control this infection. Operations done early are frequently followed by intrasinus infection. On the other hand, a perisinus abscess may be found in delayed operations, the sinus bathed in pus and granulations on the sinus and yet no infection within. The character of infection and resistance of the patient are the controlling factors.

7. The best prophylactic measures for sinus thrombosis are: *1*, Early myringotomy. *2*, A mastoidectomy as soon as a diagnosis of an operative mastoiditis is made.

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816 Medical Art Building.

A SATISFACTORY MASTOID BANDAGE.

LYMAN RICHARDS, Boston.

To the average aural surgeon the mastoid bandage is a rather minor element in the post-operative treatment and a procedure frequently delegated to a house officer, nurse or orderly. It is nevertheless an unpleasant experience on visiting a patient to find the bandage well down over the eyes or even permitting an exposure of the wound itself, with a possibility of infection. This is particularly true in the case of infants whose habit of "rooting" and pulling at a bandage often loosens it and necessitates its reinforcement or reapplication.

Fig. 1. The bandage, applied in a fan-shaped manner, is ready to be tied.
Fig. 2. The free end of the bandage is about to be drawn up under the narrowest point by a curved clamp introduced from above between the skin and the bandage.

This difficulty arises from the fact that the bandage must be applied to an irregularly curved surface, requiring some special form of anchorage in order to secure it permanently in place. One of the common methods of securing this fixation is by the use of a cross strip of gauze, laid transversely across the side of the head, over which the bandage is applied and which is finally tied in such a way as to constrict the bandage turns at one point, thus affording tension on the upper and lower borders and preventing slipping to a great degree. The constricting loop, however, can itself slip either forward or backward, being unattached anteroposteriorly, and in addition the final turn of the bandage must be secured in some way, usually with adhesive plaster, than which there is no more unsatisfactory method of gauze fixation.

It was to meet these two difficulties that the author first made use of the two small modifications illustrated by the accompanying pho-

Editor's Note: This mss. received in The Laryngoscope Office and accepted for publication Sept. 26, 1925.

tographs. It will be seen that by using the end of the main bandage as a constricting loop no free end is left to be dealt with and, still more important, a tensile support is afforded the loop from behind, such that it is held immobile by a —| - shaped, almost three point suspension, mechanism, which adds an important element of security.

Fig. 3. The free end is now above, the looped and attached end below the constricted point. These ends are next tied together over the bandage, one being single, the other a double strand.
Fig. 4. The loop being tied.

Fig. 5. The bandage tied. The constricting loop is maintaining tension on the upper and lower edges of the bandage and is itself held immobile by its attachment posteriorly to the final turn of the bandage from which it is derived.

This arrangement is obviously simple and perhaps unimportant, but the repeated and enthusiastic comments of house officers, nurses and orderlies, to whom the work of bandaging often falls, has led the author to present it for the benefit of those who may find it useful.

270 Commonwealth Avenue.

PUNCTURE OF THE MAXILLARY SINUS.*

Dr. Simon L. Ruskin, New York City.

Puncture of the maxillary sinus is practically an indispensable adjunct for the diagnosis and treatment of maxillary sinusitis, yet one sees this procedure frequently avoided because of the difficulties and complications incident to the usual technique. Instead of being a gentle procedure performed with due regard for the detailed anatomy of the lateral wall of the nose, one too often sees antrum puncture performed by sheer force of pushing a heavy trocar blindly in the direction of the maxillary cavity. It is not unusual to see the heavy antrum trocars bent in a futile attempt to penetrate the thickest part of the inferior meatus when the same antrum could be punctured with ease by a thin needle properly placed. Without a thorough knowledge of the anatomy of the maxillary sinus and lateral wall of the nose, puncture of the antrum becomes, as I have frequently seen, a matter of blind force instead of the delicate procedure it should be.

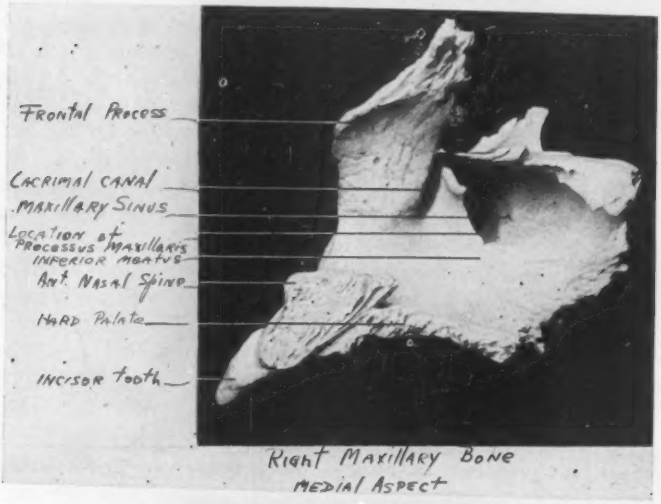
The maxillary bone has a pyramidal shaped body to which are attached four processes, the frontal, which reaches up to the frontal bone and goes to make up the root of the external nose, the zygomatic, extending laterally to articulate with the zygoma, the palatine, which forms the anterior two-third of the hard palate, and the alveolar process for the teeth. The pyramidal body of the maxillary bone, which is hollowed out by the sinus, has its base facing the lateral wall of the nose and presents here a large defect, the hiatus maxillaris. This large window leading into the sinus is closed for the most part by bone and for the lesser part by membrane. The perpendicular part of the palate bone closes the posterior portion of the hiatus, the uncinate process and bulla of the ethmoid the upper, and the processus maxillaris of the inferior turbinate closes the lower portion. Plate 3 illustrates this schematically.

The inferior meatus as can be seen from Plate 3 is formed by the maxillary bone around the hiatus maxillaris and the delicate wing-like processus maxillaris of the inferior turbinate that goes to close the lower portion of the hiatus maxillaris. The bone of the processus maxillaris of the inferior turbinate is practically always

Editor's Note: This mss. received in The Laryngoscope Office and accepted for publication Aug. 29, 1925.

*Reported from the Nose and Throat Department of the New York Post-Graduate Medical School and Hospital. Service of Dr. C. J. Imperatori.

delicate, whereas the maxillary bone around it varies in thickness and in cases where the antrum is small can reach a considerable thickness. This is well illustrated in Plate 4. It is thus obvious that the most desirable point for puncture is the processus maxil-

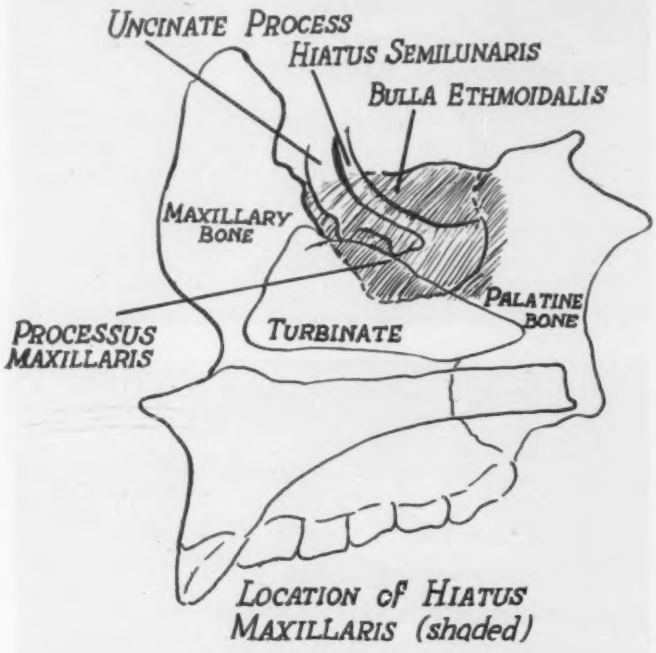


laris of the inferior turbinate. It is this anatomical point that has led me to devise the antrum needle so as to make the point of the needle seek out the thin processus maxillaris for puncture.

A study of the inferior turbinate (Plate 5) shows it to consist of two main portions, a turbinal part that hangs free in the nose and the wing-like processus maxillaris joined to its upper edge and fit-

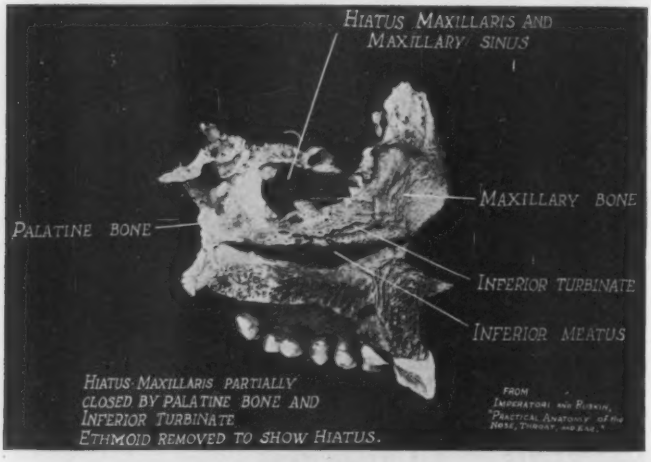
ting into the hiatus maxillaris. The upper margin of the inferior turbinate along its attachment to the lateral wall slopes slightly upwards in its anterior third and then bends gently downwards as it runs posteriorly. Slightly behind the apex of the curve the processus maxillaris is reached and here at the uppermost point between the turbinate and the lateral wall is the point of choice for puncture.

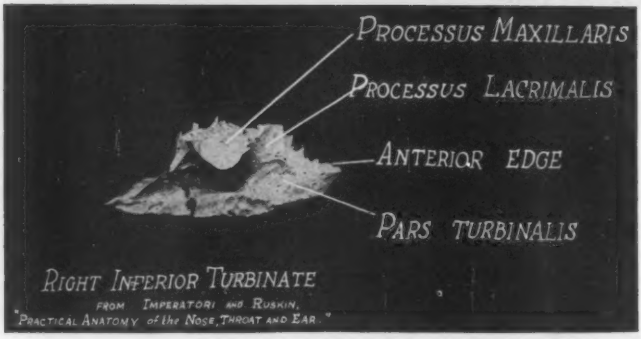
On examining the frontal section of the skull shown in Figure 6 one sees plainly the difference in thickness of the bone at the lower part of the inferior meatus formed by the maxillary bone and the



thin process maxillaris of the inferior turbinate at the upper part of the inferior meatus. Usually the inferior turbinate is so close to the lateral wall near its attachment that the heavy trocar ordinarily used is too wide to gain entrance to this region. The result is that the thick needle has to be forced through the thickest part of the inferior meatus, this making the puncture of the antrum a difficult procedure.

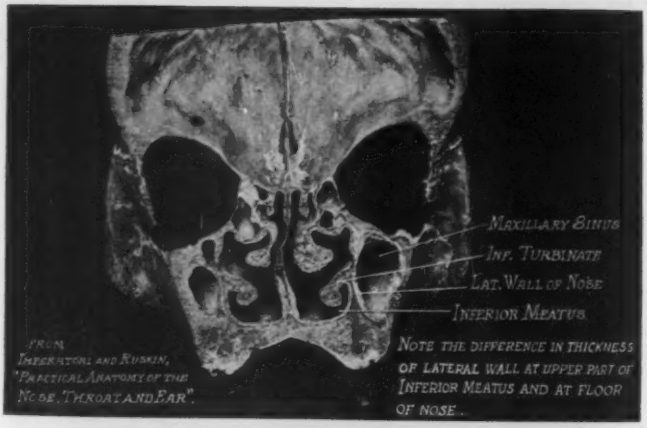
The mucosa lining the antrum is thin and loosely connected to the bone by a thin submucosa. Dilated veins when they occur are most usually found on the roof of the antrum or on the medial wall. This point is not sufficiently considered in puncture of the antrum. If a heavy, blunt trocar is forced through the bone of the inferior

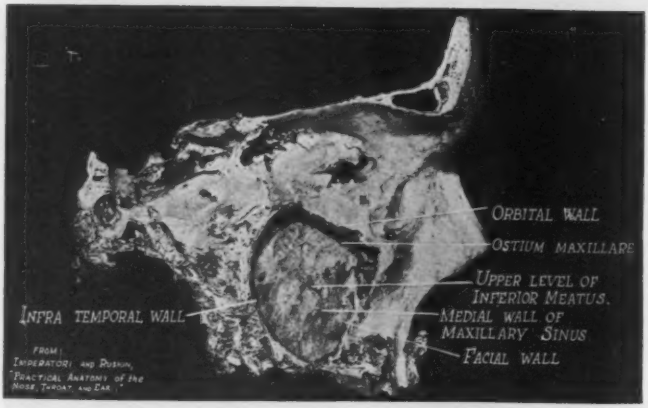


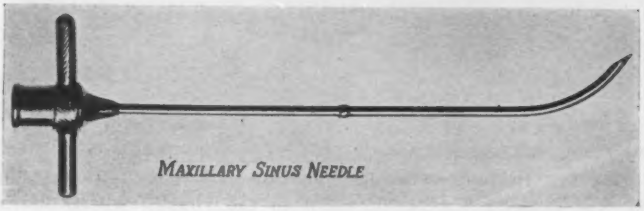


meatus it can lift the mucosa off the antrum wall instead of piercing it. The fluid or air is then injected into the submucosa, causing the complications reported incident to this procedure.

The question as to whether the middle or inferior meatus should be selected for puncture arises to a large extent from a consideration

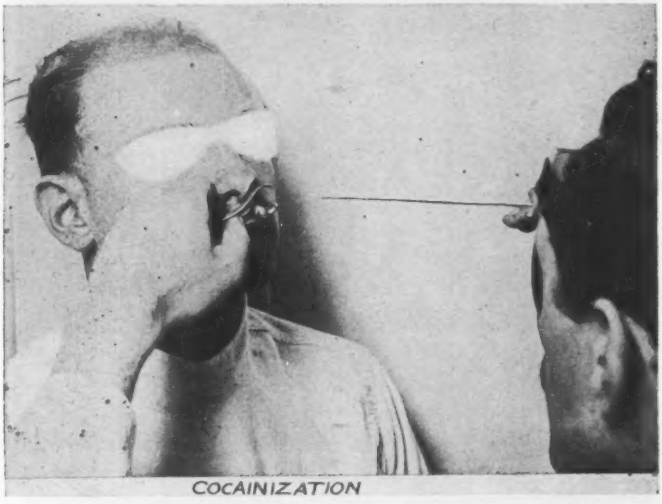

MAXILLARY SINUS
INF. TURBINATE
LAT. WALL OF NOSE
INFERIOR MEATUS
NOTE THE DIFFERENCE IN THICKNESS OF LATERAL WALL AT UPPER PART OF INFERIOR MEATUS AND AT FLOOR OF NOSE.
FROM IMPERATORI AND RUSKIN, "PRACTICAL ANATOMY OF THE NOSE, THROAT AND EAR".


ORBITAL WALL
OSTIUM MAXILLARE
UPPER LEVEL OF INFERIOR MEATUS.
INFRA TEMPORAL WALL
MEDIAL WALL OF MAXILLARY SINUS
FACIAL WALL
FROM IMPERATORI AND RUSKIN, "PRACTICAL ANATOMY OF THE NOSE, THROAT, AND EAR."


MAXILLARY SINUS NEEDLE

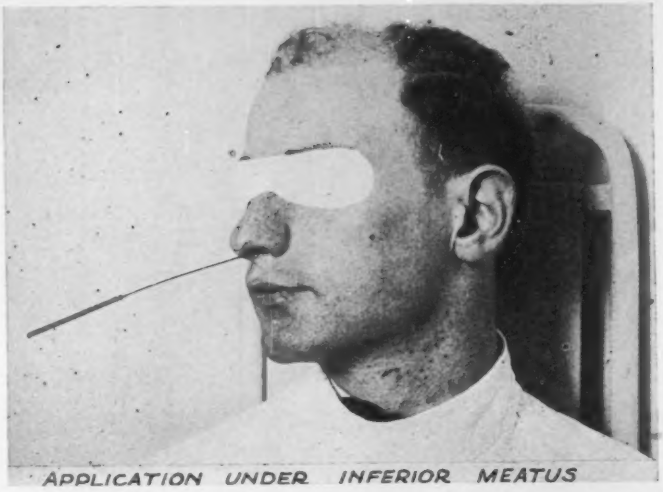
of the difference of thickness between the lateral wall in the two locations. There is no doubt that the middle meatus is very thin and therefore much more easily punctured than the inferior meatus,

but the orbit lies so close to the middle meatus as to make this route distinctly dangerous. Should the needle escape entering the orbit

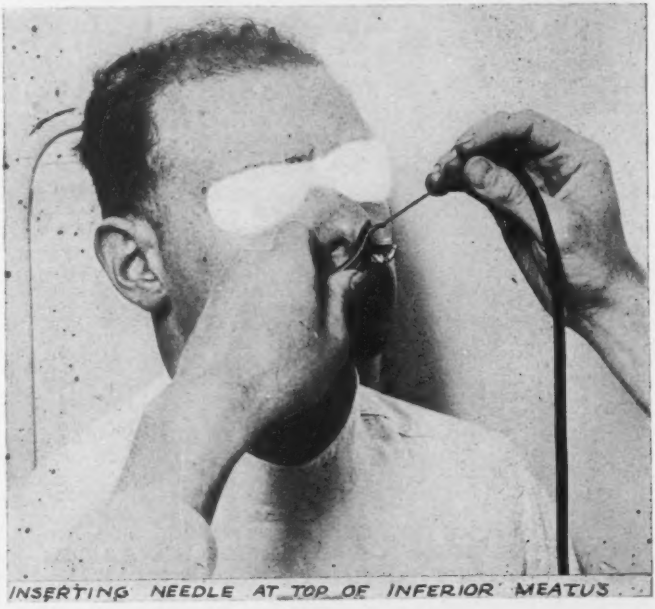


COCAINIZATION

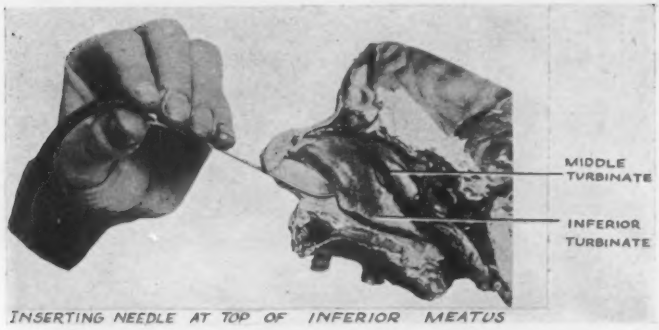
wall when puncture is made through the middle meatus it still runs the danger of sliding under the mucosa of the roof of the antrum and thus bringing the needle point in the vicinity where dilated



APPLICATION UNDER INFERIOR MEATUS

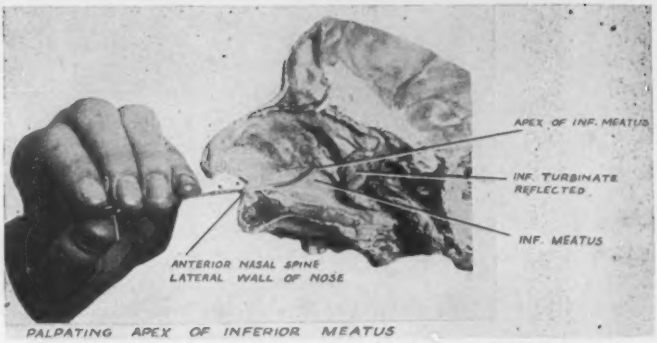


INSERTING NEEDLE AT TOP OF INFERIOR MEATUS



INSERTING NEEDLE AT TOP OF INFERIOR MEATUS

PALPATING APEX OF INFERIOR MEATUS
NOTE MANNER OF HOLDING NEEDLE

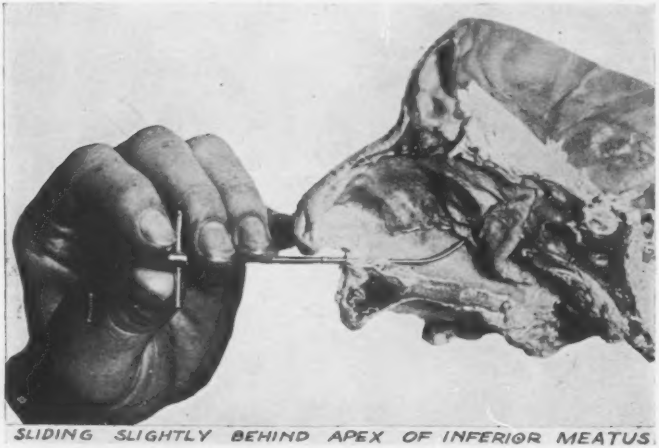


PALPATING APEX OF INFERIOR MEATUS

SLIDING SLIGHTLY BEHIND APEX OF INF. MEATUS. NOTE POSITION OF HAND

mucosa veins are most frequently found. It is for these reasons that puncture through the inferior meatus has been preferred even though the wall is thicker. On examination of the upper middle third of the inferior meatus, which is the region occupied by the processus maxillaris of the inferior turbinate, we find that here the inferior meatus is only slightly more resistant than the middle meatus and is in addition much safer than the middle meatus. There is, therefore, but little advantage to counterbalance the dangers of middle meatus puncture.

Plate 7 shows the medial wall of the antrum with its ostium directly under the floor of the orbit. At about the center is the mark made by the needle as it passed through the processus maxillaris.



SLIDING SLIGHTLY BEHIND APEX OF INFERIOR MEATUS.

It is labeled upper level of inferior meatus and shows the difference in height between inferior and middle meatus puncture.

In the February, 1924, issue of THE LARYNGOSCOPE, I reported a new needle for puncture of the maxillary sinus and described a technique for its use. The needle was constructed to counteract the dangers and difficulties of antrum puncture. Since its introduction at the New York Post-Graduate Hospital, in a series of several hundred antrum punctures, it has proven safe and easy.

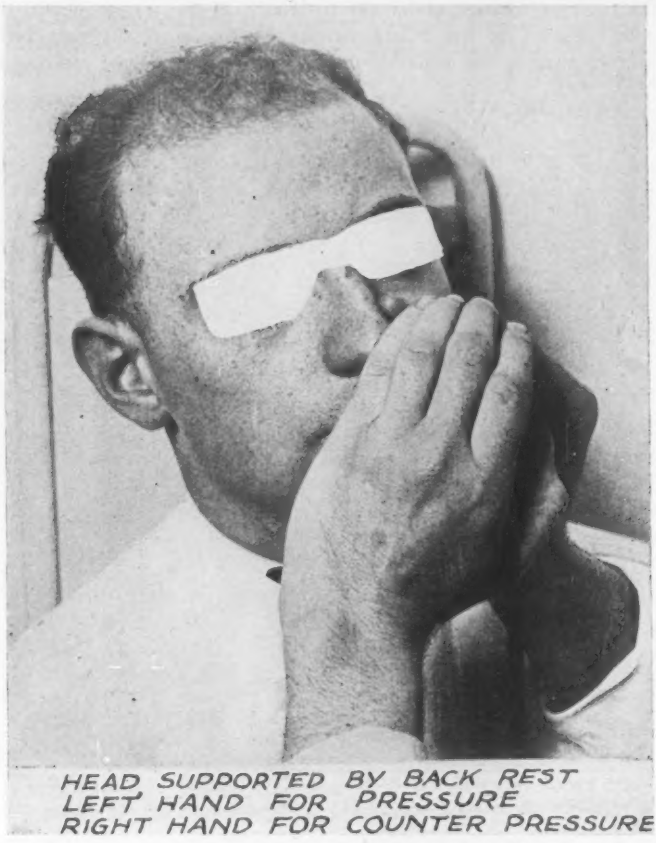
The needle presented has several features that recommend it. On the needle, at a point 4 c.ms. from the tip is a marking which indicates the average distance of the processus maxillaris from the anterior nasal spine so that those who are less experienced have a guide as to the depth that the needle should be inserted. It also

aids in locating the same site for repeated punctures. The middle third corresponds to the location of the processus maxillaris. The upward curve at the point is such that when the needle is placed in the inferior meatus, under the turbinate, at the proper depth, the point lies in the immediate vicinity of the processus maxillaris. Simply pushing the instrument backward with a slight rotation to

RESTING HYPOTHENAR EMINENCE OF HAND ON MAXILLA TO FIXATE NEEDLE

the lateral wall and outward, as though it were a straight needle forces it into the maxillary sinus. The point of the needle has a mule back tip which adds sharpness to the instrument. The handle is a modification of the late Professor Fein's needle and is quite useful in that it allows delicate and exact manipulation. It is held between the thumb and fingers as illustrated in Plate 9, the hyothenar eminence of the hand resting on the patient's maxilla. The left hand covers the right and is used for pressure while the right hand serves for counter-pressure. Thus the point of the needle is con-

trolled at all times. The upper pole of the handle is milled so that in withdrawing the needle the milled pole is turned up to the vertical plane and extracted. When the needle is in the sinus, rotating it



gently will tell you whether the tip is free or caught in the soft tissue. This is a great aid in avoiding the dangers resulting from injection of air or infected fluid into a dilated vein. Finally, the gauge of the needle is thin enough to make the whole procedure a gentle manipulation and still strong enough to allow of its use without fear of its breaking.

Occasionally, it will be found that the point or the needle has met too great a resistance. In those cases, the needle is generally too

low, and too much anteriorly. Disengaging the point and pushing the needle further back and higher between the inferior turbinate and the lateral wall will lead you to a place where the needle will break through with ease. The needle is also threaded for the attachment of the ordinary Luer syringe for the introduction of medication into the antrum or the aspiration of pus for bacteriological study. Plates Nos. 10 to 24 demonstrate antrum puncture on the patient and the corresponding positions on the cadaver.

Plate 10 shows the cocainization for antrum puncture. One frequently sees long strips of cotton soaked in cocain solution and placed between the septum and turbinate rather than between the turbinate and lateral wall where it belongs. Cocain application should be made exactly to the area to be punctured. For this purpose two to three drops of 10 per cent cocain with adrenalin soaked in cotton wrapped on a fine applicator and placed in the middle third of the inferior meatus gives adequate anesthesia. Occasionally, one has to make two or three such applications. In all the amount of cocain used is very much less than by ordinary packing. It is advisable also to paint the middle meatus with 4 per cent cocain adrenalin to shrink the tissues of the middle meatus and thus provide an easier outflow from the antrum. By this manner of cocain-

ization one rarely sees the toxic effects of cocain with its pallor, palpitation and fainting.

Plate 11 shows applicator left in place for 10 minutes. I have also devised a thin applicator that is especially suitable for nasal applications.

Plates 12 and 13 show the manner of holding the needle and inserting it into the inferior meatus. The point of the needle can be seen entering the upper part of the inferior meatus.

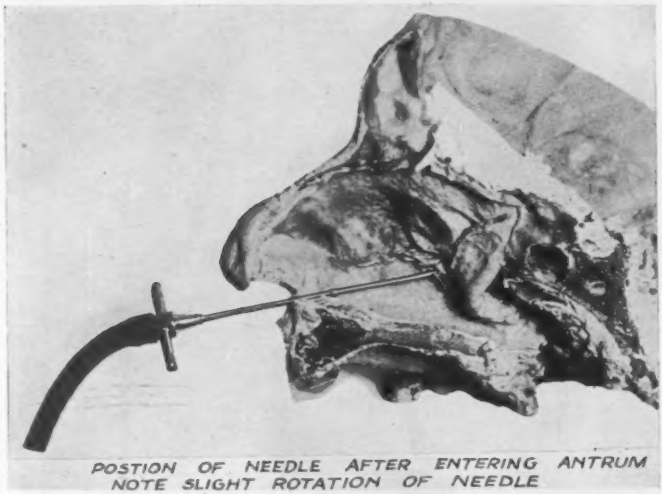
POSITION OF NEEDLE AFTER ENTERING ANTRUM

Plates 14 and 15 show the nasal speculum put aside and the needle sliding along the roof of the inferior meatus to the apex of the inferior meatus. Note that the hand has come down as the needle slides along the roof of the inferior meatus.

Plates 16 and 17 show the needle sliding slightly behind the apex of the inferior meatus to the location of the processus maxillaris. Plate 18, when the needle reaches this point the hypothenar eminence of the hand is brought to rest against the maxilla of the patient thus fixing the position of the needle and the head. Should the patient move his head, the needle is not dislocated. This also prevents too sudden entrance of the needle into the antrum. The fingers in

front of the crossbar also give a certain amount of counter-pressure, making the entrance of the needle smooth.

Plates 19 and 20, the head supported by a back rest, the left hand is used for pressure and the right for counter-pressure. The needle is pushed directly back and outward exactly as if it were a straight needle. In practically all cases the needle will glide in easily. Occasionally, one meets with a good deal of resistance. In those cases the needle is probably too low in the inferior meatus or too much anteriorly. In that event disengage the point and make a better application. If the application is correct it may be necessary to use a little more pressure. Frequently the beginner is afraid to use enough



POSTION OF NEEDLE AFTER ENTERING ANTRUM
NOTE SLIGHT ROTATION OF NEEDLE

pressure for fear the needle will break. If the needle is pushed like a straight needle it will stand more pressure than is ever necessary for an antrum. The needle must not be twisted or turned into the antrum like a Coakley or Douglass trocar. When turning a needle one gets only the strength of the thickness of a needle, which is at most 5 m.m., whereas when the needle is pushed straight one gets the strength of the length of the needle, which is equivalent to a thickness of 70 m.m.

Plate 21 shows the needle having entered the antrum, the milled pole of the handle indicating the direction of the point being upward.

Plates 22 and 23 show the lateral direction taken by the needle.

Plate 24, after the needle has entered the antrum, the needle is rotated so that the milled part of the handle points downward, indicating that the point of the needle is directed to the floor of the

antrum. This last movement is to my mind the most important and the greatest factor for safety in antrum puncture. Should any of the usual accidents have occurred, that is, the entrance of the point of the needle into the orbit or submucosa, the rotation of the needle through an area of 145°, frees the point so that no air or fluid is forced into the wrong place. Also if one can rotate the needle point

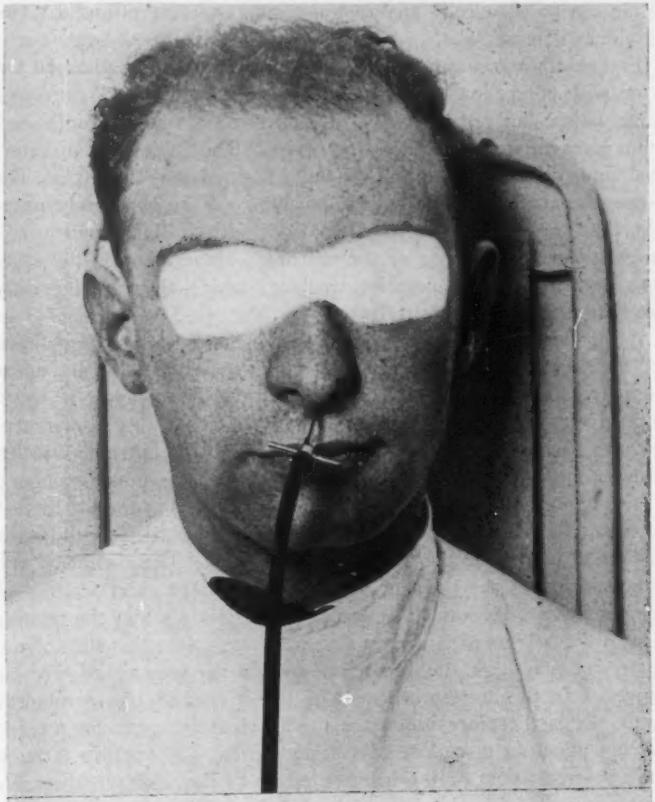
freely one can be certain that the needle is in the antrum. The crossbar handle has one side milled, showing the direction of the needle point, and one side smooth.

In this manner the antrum can be smoothly punctured with little or no shock to the patient and easily irrigated with safety.

The needle is also excellently adapted for bacteriologic study of the antrum contents, a problem worthy of much more consideration

than has yet been accorded to it. The needle is threaded for the usual record syringe.

For this purpose I paint the vestibule and inferior meatus with 2 per cent mercurochrome. The antrum is then punctured. A 10 c.c. syringe containing normal salin is screwed on to the needle.



POINT OF NEEDLE DIRECTED DOWN-WARDS READY FOR IRRIGATION

The saline is injected into the antrum and then drawn back again into the syringe. In this manner one gets a culture of the organism useful from many points of view. One can determine whether the antrum contents are mucous or pus; whether one is dealing with a catarrhal or purulent inflammation, and the character of the organism. The organism can also be gotten in this manner for the produc-

tion of autogenous vaccines for injection or nasal applications. One can no longer be content with the mere irrigation of the antrum and the estimation of the products by gross inspection in the basin. The uniform injection of 10 or 15 c.c. of normal saline and its withdrawal after being mixed with the antrum contents gives us a new manner of studying the antrum. Besides bacteriologic analysis, the return saline can be chemically analyzed as to mucous content and a series of values determined.

Frequently one sees a case having the earmarks of a diseased antrum with polypi low in the middle meatus, antrum dark on transillumination, but no pus visible in the nose. Irrigation of the antrum gives an apparently negative return. There are cases of catarrhal sinusitis as important as the more flagrant purulent type. The gross examination of the antrum washing will be apparently negative, but the examination of the 10 c.c. diagnostic specimen will reveal the true character of the antrum. These are also the cases that return after a negative washing, saying they were greatly benefitted by the antrum irrigation.

After the diagnostic specimen has been taken, the syringe is taken off the needle and the rubber tube adapter inserted. The antrum is then irrigated with sterile saline till clear. The adapter is again slipped out and the syringe containing 10 c.c. of 1-200 mercurochrome, acriviolet, or other drug injected into the antrum. In this manner medication can be brought directly to the antrum mucosa.

The important role played by maxillary sinusitis in the productio of nasal obstruction, chronic laryngitis and bronchitis in children is beginning to receive the attention it deserves. The maxillary and ethmoid sinuses are present at birth and are the chief sources of chronic nasal infection. The accompanying plate shows the relative size of the antrum in an infant 1 year of age. Note that the antrum cavity is fairly high, due to the presence of the unresorbed alveolar process. In this unresorbed area lie the centres for the permanent teeth. It is therefore important to utilize the same technique for antrum puncture in children as in adults, that is, puncture through the uppermost part of the inferior meatus. For children the same antrum needle is used as recommended for adults, because the needle is already sufficiently thin. There is, however, a smaller size made, which can be used for children. The marking for the depth must, however, be disregarded. Although antrum puncture in maxillary sinusitis in children frequently yields brilliant results, nevertheless it is not always very practical: Local treatment in the nose supplemented by gentle suction with head held in a position that aids drainage will usually give excellent results.

351 West 86th Street.

HYPERPLASTIC MAXILLARY SINUSITIS.*

DR. WM. MITHOEFER, Cincinnati.

It has been known for many years that nasal polypi are an extension of a primary disease in the antrum, but that hyperplasia of the antrum without extension of polypi into the nose exists has not been very often recognized. In 1894, Avellis emphasized the fact that nasal polypi were secondary to an antrum infection. Later, in 1913, he described a form of nasal polyposis with antrum hyperplasia, but with the absence of pus in the nose and antrum. In 1907, Uffenorde made the assertion that nasal polyposis existing for a great length of time will eventually attack the mucous membrane of the nasal accessory sinuses and cause hyperplastic changes in these cavities. Hajek insists that polypi in the nose may exist without the presence of a purulent nasal sinus infection and are often associated with hyperplasia in the nasal sinuses.

My observations, made in the series of cases on which this paper is based, have convinced me that, in many instances, the antrum is primarily involved with hyperplastic changes and that a greater part of the polypi filling the nasal chambers are but an extension of the antrum hyperplasia which may have been present for many years. In an extreme case of nasal polyposis, the antrum cavity is not alone involved. The ethmoid cells as well show marked hyperplastic changes.

It has long been the custom of rhinologists to remove with a snare the offending nasal polypi which repeatedly made their appearance and to curette if necessary the ethmoid cells. It would be futile to deny that occasionally a good result has followed this procedure, but it must be admitted that as a rule the polypi rapidly returned. I am firmly convinced that, in order to obtain a good result in most cases of pronounced nasal polyposis, it is necessary as the first step of the operation to investigate the condition of the maxillary sinus. A very striking proof of the correctness of this statement is shown in my experience with this method of dealing with nasal polypi during the past ten years. The results obtained from this procedure have been unusually satisfactory and the polypi did not recur except in a few cases, in which the laterally displaced ethmoid cells and frontal sinuses had also undergone hyperplastic

Editor's Note: This mss. received in The Laryngoscope Office and accepted for publication Sept. 14, 1925.

*Thesis accepted by the American Laryngological, Rhinological and Otological Society, May, 1925.

changes. The study of this problem during these years was the means of bringing to my attention a form of hyperplastic disease of the antrum in which there were few if any pathological changes to be seen in the nasal mucosa, namely, primary hyperplastic maxillary sinusitis.

In 48 radical maxillary sinus operations which were performed for the removal of hyperplasia not associated with suppuration and upon which the study of this subject is based, 28 times, the nasal chambers were found completely filled with polypi. In every instance of marked nasal polyposis, the mucous membrane of the antrum had also undergone polypoid changes. Most of the polypi in the nose were found to be but outgrowths of the antrum hyperplasia. In only one patient was the antrum wall found intact, so that the hyperplasia in the maxillary sinus had no communication with the nasal polyposis. Solitary nasal and retronasal polypi were present six times. In every case the pedicle of the polyp had its origin within the antrum cavity. Mild hyperplastic ethmoiditis without polypi and with a coexisting marked hyperplasia of the antrum was present nine times. Repeated vasomotor disturbances of the nasal mucosa with the absence of pathological changes in the nose but with the existence of marked hyperplasia of the antrum found at the time of operation was observed in five cases.

This series does not include radical antrum operations on patients with a purulent nasal discharge and in whom associated with the infection there was also present a hyperplasia of the lining membrane of the antrum.

Hyperplastic maxillary sinusitis may be present in four distinct types, depending on the extent of involvement.

1. Antrum hyperplasia with extension of polypi into the nose, combined with suppuration (mixed form—not included in present series).

2. Antrum hyperplasia with extension of numerous polypi or a solitary polyp into the nose, but with the absence of a purulent discharge.

3. Hyperplasia of the antrum without extension of polypi into the nose, but with the presence or not of mild pathological changes of the nasal mucous membrane and other sinuses (primary hyperplastic maxillary sinusitis).

4. Hyperplasia of the recesses of the antrum only (recess hyperplasia).

The thoughts expressed in this paper refer only to the latter three forms of the disease. The first named variety comprises another large class and should be dealt with separately.

PATHOLOGY.

During the process of an acute catarrhal inflammation of the antrum, the superficial layers of the mucous membrane show a marked cellular infiltration with serous exudation between the connective tissue cells. After the acute symptoms subside, the mucous membrane is probably somewhat thicker than before the inflammation existed. If the inflammatory process continues, the cellular infiltration penetrates to the subepithelial layers and surrounds the glandular structures, resulting in marked edema of the mucous membrane. Probably, at this stage, the disease often becomes latent. With each succeeding acute attack, the already thickened antrum mucous membrane participates so that, eventually, fibrous degeneration of the connective tissue takes place with resulting hyperplasia and cyst formation from pressure of the new tissue on the glandular structures. It is hard to say how long a time elapses from the beginning of an acute inflammation to the stage of true hyperplasia; in some cases, probably many years; in others, depending on the severity o fthe attack, but a short time. When the mucous membrane is very edematous as a result of an acute process and measures for the relief of this edema are not employed, it is easy to conceive of the acute process entering immediately into the subacute and finally the chronic state. It probably takes several years for polypi to make their appearance in the nose. The age of the youngest patient of my series was 11 years. She had large polypi, both in the nose and retronasally, and the antrum was found completely filled with hyperplastic tissue.

SYMPTOMS.

The local changes which occur in the nose vary in degree from complete or partial closure of the nasal cavity with polypi to mild hyperplastic changes and vasomotor disturbances of the mucosa. In this paper, we shall dwell more particularly on that form of maxillary sinus hyperplasia associated with minor pathological changes in the nose.

Nasal manifestations: In most of the cases, there was present a chronic turgescence with an occasional hyperplasia of the inferior turbinate. The swelling of the inferior turbinate is undoubtedly the result of pressure from the hyperplasia within the antrum, resulting in secondary passive hyperemia of the nasal mucous membrane. Of equal importance as a symptom suspicious of hyperplastic maxillary sinusitis is a swelling immediately above the inferior turbinate, the so-called supraturbinal hypertrophy. By this, I do not refer to the enlargement of the uncinate process so often found in suppurative sinusitis, but to a distinct hyperplasia in contact with the upper

edge of the inferior turbinate. Hyperplastic changes of the middle turbinate are fairly common, but what is still of greater importance is the condition of the ethmoid floor. By means of median rhinoscopy, I have, in many of the patients, been able to demonstrate the presence of a hyperplasia in this region. When this pathological change of the ethmoid floor is found, the case is worthy of attentive study and the antrum in particular should receive careful consideration in view of the fact that the mucosa of the antrum may be undergoing the same pathological change as is the mucous membrane of the ethmoid cells. Both regions may have been affected simultaneously as a result of a bacterial invasion of the nasal cavity.

If a solitary polyp is present, its pedicle can often be traced to the region of the os maxillaris. It will be found that the pedicles of the solitary polypi are often attached to the wall of the antrum and have found exit through an enlarged normal or accessory ostium. The safer method of removing solitary polypi is to sever the pedicle in the antrum rather than attempt the removal intranasally with the snare. By enlarging the ostium of the antrum in the process of the radical operation and liberating the pedicle from its attachment to the antral wall, the entire polypi may easily be drawn from the nose or postnasal space into the antrum. If a conservative operation is done and the polyp removed intranasally, the pedicle may recede into the antrum, and cause a protracted and serious hemorrhage.

Nasal discharge: Frequent attacks of vasomotor rhinitis with marked hydrorrhea may be caused by a primary hyperplastic maxillary sinusitis. This phenomenon was met with several times so that I now rarely proceed with the treatment of a vasomotor rhinitis without first excluding the antrum as a possible causative factor.

An interesting observation made in some of the patients was a complete absence of nasal discharge anteriorly except during an acute exacerbation. In these cases, the hyperplastic or laterally displaced middle turbinate and the thickening of the mucous membrane around the anterior portion of the os maxillaris made it possible for the secretion from the antrum to drain posteriorly only. One of the chief complaints of many of the patients was a discharge postnasally at frequent intervals during the day and night of large quantities of mucus. In these cases, there was often found a large accessory opening, making it possible for free drainage to take place posteriorly. In but few of the patients was there a purulent nasal discharge at the time of examination, although many gave a history of having had the presence of pus during an attack of acute rhinitis.

It would be too delicate a discernment to say that these patients had never had an acute purulent infection of the chronically diseased mucous membrane of the antrum.

There was never present any decided pain on pressure over the antrum, although several patients complained of a feeling of fullness in the cheek. When headache was present, it was usually of the supraorbital type. Referred pain in the supraorbital region is, as we know, common in antrum disease. Loss of the sense of smell was present only in those patients in whom the polypi had obstructed the region of the olfactory fissure.

GENERAL SYMPTOMS.

Many of the patients showed the effects of chronic toxemia and nasal obstruction. This systemic disturbance was always aggravated during an acute exacerbation. At this time, the patients complained of lassitude, were easily exhausted and had occasionally arthritic symptoms. Bronchitis was present very often during an acute flare-up, but asthma did not accompany the bronchitis as frequently as in the suppurative variety of antrum disease.

DIAGNOSIS.

The method of procedure which I have adopted in all patients in whom I am suspicious that there is present a hyperplastic maxillary sinusitis is as follows:

When rhinoscopic examination shows the presence of any of the nasal changes which often are associated with the disease, I order a skiagram of the nasal sinuses made before proceeding with the examination. If the skiagram shows the antrum to be cloudy and the nasal cavity is filled with polypi, the diagnosis is almost assured. I have yet to find an antrum which did not contain a large amount of hyperplastic tissue in patients whose nasal cavities were filled with polypi and in whom the skiagram showed an opaque antrum. If a small amount of hyperplastic tissue is seen on the ethmoid floor or lateral wall of the nose or if there is present a vasomotor disturbance or a chronic turgescence of the inferior turbinate and the antrum appears cloudy or even mildly opaque, a tentative diagnosis of hyperplasia of the maxillary sinus is made.

The antrum is next irrigated through the normal orifice or through an accessory opening, if one is present. The washings are usually negative, but occasionally large quantities of mucus and a little pus will be seen in the irrigating fluid. If the ostium of the antrum is large enough, a sound is then passed into the cavity and its walls are probed in order to ascertain, if possible, the presence or absence of polypoid changes. An interesting phenomenon ob-

served during irrigation in a few patients was the flapping sound of a polyp against the walls of the antrum. In one of the patients, after irrigation, a polyp was seen protruding from the region of the os maxillaris. Lavage of the antrum is an important diagnostic measure when there is present a suppuration in the antrum, but it has scarcely any value in the type of disease under discussion.

In some cases, the only true diagnostic means at our command is an exploratory opening of the antrum made in the canine fossa. Another diagnostic measure which I have used on many occasions is the tuning fork test described by Glas. A vibrating C_2 fork is placed in the midline of the forehead and if there are present marked changes in the antrum, the vibrations will be felt more distinctly towards the affected side.

A blood Wassermann test is made on every patient before doing an operation on the nasal sinuses. It would be an inexcusable omission if this were not done, in view of the fact that during the past few years I have seen thirty patients who had a positive Wassermann and in whom the clinical findings and the skiagrams made it almost certain that the nasal accessory cavities were involved. Nasal operations as well as operations on the nasal accessory sinuses on patients with syphilis should never be attempted unless the symptoms persist after the blood Wassermann test has become negative. The only exception to this rule would probably be the careful removal of a few polypi in order to relieve the patient of a complete nasal obstruction.

The skiagram, if it shows an opaque antrum, is an important diagnostic aid, but it must be remembered that, in the presence of only a mild opacity, the antrum may be the seat of polypoid changes located chiefly in the recesses. In some instances, the lower half of the antrum is cloudy, while the upper half remains clear. In these patients, polypoid changes in the alveolar and palatine recesses are often found. The point I wish to emphasize in this connection is that negative X-ray findings of the antra in the presence of hyperplastic changes in the nose should impress upon us the importance of exploring the antrum if intranasal methods have failed to effect a cure and the symptoms continue as before or polypi again present themselves in the nose. I have seen several patients in whom a solitary polyp recurred a short time after operation and in whom the skiagram showed a clear antrum. When an exploratory opening was made, it was found that the hyperplasia of the antrum was limited to the region of the infraorbital recess and that the polyp was an outgrowth of the hyperplastic tissue occupying this region.

EXPLORATION OF THE ANTRUM.

The simple technic employed in this procedure ought make it a diagnostic method frequently used in all cases where any doubt exists as to the condition of the cavity in the antrum. I am firmly convinced that, if an exploratory opening of the antrum is more often made before proceeding with an intranasal sinus operation, failures after operation will be less frequent.

After the injection of 1 per cent novocain solution into the region of the alveolar ridge and periosteum covering the facial wall of the antrum, a small incision is made in the mucous membrane immediately above the alveolar ridge and the soft parts carefully elevated from their bony attachments. An opening into the antrum about the size of a large pea is now made in the canine fossa and the cavity of the antrum inspected and probed. In most instances, as soon as the antrum is opened, the hyperplastic tissue protrudes. At other times, it is necessary to probe the cavity or enlarge the opening for better inspection. When the antrum is found involved, the incision is enlarged and the radical operation of the sinus follows. When the cavity is found to be healthy, one suture is sufficient to close the incision. I make an exploratory opening of the antrum in the presence of the following condition:

1. Nasal polyposis with or without a cloudy skiagram of the antrum.

2. Solitary nasal and retronasal polypi, when the pedicle can be traced to the region of the os maxillaris and the antrum skiagram is or is not cloudy.

3. As a preliminary step in an ethmoid operation when the skiagram shows a cloudy antrum.

4. Abundant postnasal discharge of long duration when other means have failed.

5. If, with lavage of the antrum, there is present *a*, flapping sound of polyp against the antral wall; *b*, polypi in region of os maxillaris after lavage; *c*, when probing reveals hyperplastic changes.

6. In the absence of pathological changes of the nasal mucosa, when the patient complains of constant fullness in the cheek and the skiagram of the antrum is cloudy.

It is entirely within the realm of probability that all cases of hyperplastic maxillary sinusitis are preceded by an acute suppuration in the antrum. The acute symptoms subside, but the insult that has been inflicted on the lining mucous membrane is sufficient to produce slowly a hyperplasia which, in the course of years, assumes larger proportions and gives rise to the symptoms under discussion. If this is an acceptable explanation of the cause of the

disease, then it behooves us to pay particular attention to the antrum in all acute infections of the nasal mucosa.

In this connection, it may not be amiss to call attention to the irrigation of the antrum through the normal or accessory opening. This method of lavage because of the ease of its performance and hence the lack of traumatism can be used more often in the stage of acute inflammation than can puncture under the inferior turbinate. The latter method is often followed by a severe reaction. In order to irrigate properly an antrum through the normal or accessory openings, it is necessary, first of all, to pass a large bent probe or, better still, a small sized Ritter's frontal sinus sound into the region of these openings so as to determine if possible the size and position of the normal or accessory ostium. Very often an opening leading into the antrum is not detected with the sound. In these instances a little pressure applied with the sound against the membranous antral wall in the lowermost portion of the hiatus semilunaris will pierce the thin wall of the antrum in this region. After the sound has been passed into the antrum and the position which it occupied on the lateral wall has been noted, a blunt-pointed canula is inserted into this region and, with gentle pressure, the antrum is readily entered. When the normal opening is easily found or an accessory opening is present, the technic is very simple, but it is always advisable to probe the lateral wall before inserting the canula. I am more than convinced every day that this method of irrigating an antrum should be the method of choice and, furthermore, in order to prevent retention of pus in an antrum, this cavity should always be irrigated before dismissing from our care a patient who has had an acute nasal infection with a profuse discharge of pus. I have used hypertonic salt solution for irrigating because of its beneficial action on edematous mucous membranes.

The probing of the antrum, which I mentioned above, is of value in many ways. It gives us not only an idea of the size and position of the ostia but also some information regarding the condition of the lining mucous membrane of the antrum. The passing of the sound into the antrum through the normal ostium tends to make this opening more patent and, furthermore, if the normal ostium cannot be found, the rupture of the membranous wall in the inferior portion of the hiatus semilunaris will be the means of allowing better exit of the irrigating solution and prevent the distressing complication which frequently occurs in doing an antrum lavage. I refer to the observation made by many of us while irrigating an antrum through a puncture made in the inferior meatus, namely, the retention of the irrigating solution within the antrum, because of a closure of the normal ostium as a result of pathological changes. Patho-

logical changes which tend to close an antrum ostium may exist on the nasal as well as on the antral wall of the opening.

It is a matter of common knowledge that many cases of suppuration within the maxillary sinus show very little hyperplastic change of the mucous membrane. In these patients, an intranasal antrum operation is of benefit. It is otherwise, however, if there is present a true hyperplastic maxillary sinusitis. In these cases, conservative intranasal operations are of little use. The hyperplasia must be removed in toto if any good is to be accomplished. It is altogether probable that it is the character of the infection and the degree of virulency of the bacteria which will cause an antrum suppuration without hyperplasia in one patient and hyperplastic disease without suppuration in another.

OPERATIVE FINDINGS.

The antrum cavity had in all of our cases undergone hyperplastic changes. In a few instances, the hyperplasia was limited to the recesses. The recess hyperplasia is undoubtedly but an earlier stage of the disease. The malar, alveolar and palatine recesses were most frequently involved. On several occasions, cysts were encountered. They are probably formed by retention from obsolete glands or by a lymph stasis in endothelial covered walls. In none of the patients was there any evidence of bone disease.

It was interesting, on several occasions, to see the pedicle of a retronasal polyp extending across the upper part of the antrum so that by enlarging the antrum opening and making traction on the pedicle the entire retronasal polyp was delivered into the antrum cavity. In these cases, there was always present a wide communicating opening of the membranous antral wall and the nose. Whether this was a large accessory opening or a widening of the normal orifice from pressure of the polypoid mass could not be determined. If it is true, as Hirsch believes, that nasal polypi from hyperplastic antrum disease are the result of a prolapse of the edematous antral mucous membrane, then we can readily understand that polypi would be more apt to appear in the nose if there were present a large opening in the antral wall of the middle meatus.

A few words must be said regarding the removal of the hyperplasia from the antrum. I have almost entirely dispensed with the use of curettes and make an attempt to deliver the polypoid tissue from the antrum en masse. First, the elevator is placed between the bone and polypoid mass present in the malar recess and the tissue carefully detached from the bone in this region, then it is passed along the orbital wall to the nasal wall of the antrum, then down the nasal wall and, lastly, along the floor. The most difficult

place to detach the tissue is in the region of the membranous portion of the nasal wall. After the mass has been sufficiently detached, a large forceps is used to grasp it in the region of the os maxillaris. In this way, the entire polypoid tissue from the antrum is removed in toto and very often if the opening into the nose is of sufficient size nasal polypi if present will be easily withdrawn and found to be attached by means of a pedicle to the polypoid mass removed from the antrum.

Curetting of the antrum cavity is seldom necessary if this method of removing the hyperplasia is used. Occasionally there remains a small amount of hyperplastic tissue in one of the recesses which requires for its removal the gentle use of a curette.

CONCLUSIONS.

The observations made on this series of cases have emphasized the following facts:

1. Maxillary sinus hyperplasia was always found when there was present an extensive nasal polyposis.
2. A hyperplasia of the antrum may be present many years without causing any symptoms referable to the antrum.
3. The failures to relieve the patient after the removal of pathological changes in the nose should direct our attention to the antrum.
4. Hyperplastic ethmoiditis of a mild type may be associated with gross hyperplastic changes in the maxillary sinuses. We will fail in our efforts if we do not consider this fact.
5. The skiagram is helpful in arriving at a conclusion as to the advisability of exploring the antrum.
6. An exploratory opening is often the only means of informing ourselves regarding the presence or not of hyperplastic changes within the cavity of the antrum.
7. Hyperplastic changes in the antrum are present more often than has been hitherto suspected and with a painstaking analysis of all factors in each individual patient, supplemented if necessary by making an exploratory opening, a diagnosis will more often be made. Of this, I am firmly convinced.
8. By suspecting the presence of antrum hyperplasia and investigating the cavity before subjecting the patient to intranasal sinus operations, more satisfactory results of nasal accessory sinus surgery will be obtained.

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19 Garfield Place.

AN ADENOIDOSCOPE.

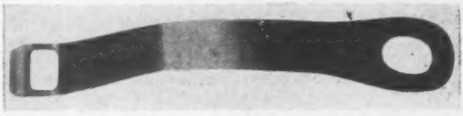
Dr. J. B. H. Waring, Blanchester, Ohio.

The little instrument illustrated herewith, which for want of a better name, I have termed an adenoidoscope, has been of considerable value, both for adenoid diagnosis by direct inspection; and for verification of the thoroughness of an adenoidectomy. Two sizes are made, one for adult throats, and one for children.

The proximal end of the instrument has been fashioned after the well known Bosworth tongue depressor; so that when it is grasped by the adenoidoscopic end, it becomes to all intents and purposes a Bosworth tongue depressor.

At the distal extremity, two slender pillars arise at an obtuse angle from the shaft proper; and are connected superiorly by a shelving platform, concaved on its upper aspect, with rounded edges and the superior edge slightly concaved in the middle. This leaves a rectangular aperture, as shown in the illustration.

In use, the tongue is held down out of the way with an ordinary tongue depressor in one hand, while with the other the adenoidoscope is carried into the mouth, its distal shelving platform de-



pressed and carried under and behind the uvula; which is thus hooked forward; and as the instrument is next gently moved upwards, the uvula is folded somewhat upon itself and rests upon the shelving platform, out of the direct line of vision through the rectangular aperture. As the shelving tip of the adenoidoscope is thus carried upwards, with the uvula lifted up also as described, the posterior pharyngeal wall comes into direct view; and with light reflected through the rectangular aperture by the head mirror, any adenoid vegetation present is clearly seen and studied.

Likewise, after an adenoidectomy, thoroughness of operation may be verified by direct inspection through this simple little instrument. By carrying the shelving portion of the instrument laterally, and gently lifting upwards the lateral free borders of the velum palati, considerable additional information may be gained as to conditions in the nasopharynx.

The instrument is made by an Eastern house; but may be obtained through surgical houses generally.

Editor's Note: This mss. received in The Laryngoscope Office and accepted for publication Aug. 3, 1925.

NOTICE OF MEETINGS.

The American Otological Society.
The American Laryngological Association.
The American Laryngological, Rhinological and Otological Society.
The American Bronchoscopic Society.

The annual meetings of the above societies are to be held in Montreal, Canada, as follows:

The American Bronchoscopic Society, May 29.

The American Laryngological, Rhinological and Otological Society, May 31 to June 2, inclusive.

The American Otological Society, June 2 and 3.

The American Laryngological Association, June 3 to 5, inclusive.

They will be the occasion of such a gathering of medical men as has not yet previously occurred.

The papers to be read will represent all of the progress that has been made in medical science as it applies to the diseases of the ear, nose and throat.

The date of our meetings is an ideal time to visit Canada and every effort is being made by the local committee of our members for the entertainment of ourselves as well as the members of our families who we hope will accompany us in goodly numbers.

To those who enjoy motoring, Montreal offers exceptional attractions for it is the converging point of as perfect a system of motor roads as the eastern portion of the country contains.

For those who desire to make it the starting point of excursions in any direction, Montreal has much to recommend itself. The cooperation of the various railway lines will be obtained to give us complete information as to the different points of interest that can be visited after our scientific work is over.

The meeting place and headquarters of all of the societies will be the Mount Royal Hotel.

D. Harold Walker, M. D., Secy.,
American Otological Society.

Robert L. Loughran, M. D.,
Secy.,
Amer. Laryngol., Rhinolog., & Otolog. Society.

George M. Coates, M. D., Secy.,
Amer. Laryngological Assn.

Henry B. Orton, M. D., Secy.,
Amer. Bronchoscopic Society.

THE EIGHTH ANNUAL MEETING OF THE AMERICAN BRONCHOSCOPIC SOCIETY.

THURSDAY, MAY 21, 1925, MORNING SESSION.

The President, Dr. Ellen J. Patterson, Pittsburgh, Pa., presiding. The following program was carried out:

Address of the President.

History of Bronchoscopy and Esophagoscopy for Foreign Body. Presentation of Instruments and Specimens. Dr. Chevalier Jackson.

The Upper Lobe Bronchoscope. Dr. Mervin C. Myerson.

Exostoses of the Cervical Vertebrae as a Cause of Difficulty in Swallowing. Dr. Harris P. Mosher.

DISCUSSION.

DR. CHEVALIER JACKSON (Philadelphia): Dr. Mosher's anatomical and embryological studies are absolutely fundamental. In the Jefferson Hospital a child in whom no endoscopy had been done died from abscess of the lung. A congenital diverticulum was found. The diverticulum had all the histological elements of the normal esophageal wall, mucosa, submucosa, longitudinal and circular muscular fibers. Dr. Baxter L. Crawford will report the case in full. Though I agree with Mosher as to an anatomical and embryologic element, yet I feel that we should not ignore the functional element. I feel that the cricopharyngeal pinchcock is to blame to a greater or less extent in all cases of pulsion diverticulum. The cricopharyngeal pinchcock should open on the approach of the bolus of food. If it does not do so an enormous pressure is put upon the hypopharyngeal wall and it herniates at the anatomic and atavistic weak point in the support of the wall. The condition seems to me parallel to the functional element in the dilatation of the esophagus in preventriculosis or so-called cardiospasm. The failure of the diaphragmatic pinchcock to open puts undue pressure on the esophageal wall which dilates, evenly if unsupported, but in pouch-like form if supported at some points, as by fibrosis, for instance. Dr. Mosher's mention of the artificial production of a pouch reminds me of a case of an insane patient who for months carried a key wrapped in a strip of fabric in a dilatation of his pyriform sinus.

DR. D. CROSBY GREENE (Boston): I have had experience with one case. There was a bolus of food at the lower end of the esophagus. The obstruction was not in the region of the spurs, but it was below the spurs. It was at the cardiac orifice of the stricture. The significance of the spurs in my case was not very apparent, although they may have been responsible.

DR. H. H. FORBES (New York): I have seen an analogous case to those cited by Dr. Mosher. There was extensive change in and around the articulating surfaces of the 5th and 6th cervical vertebrae, exostoses on the anterior surface of the cervical vertebrae from the 6th to the 2nd cervicals. I would like Dr. Mosher to add this case to the literature.

The X-ray report of the cervical spine was as follows:

Extensive changes have occurred in and around the articulations extending from the 2nd to the 6th cervical. There is marked roughening between the 5th and 6th cervical bodies and the borders of the bodies between all of these segments have lipping. A longitudinal mass of bone extends from the 6th cervical upward to the lower border of the 2nd and is more densely calcified in its half.

Diagnosis: Osteoarthritis of the cervical vertebrae with ankylosis and calcification of the tendons or muscle structures near the vertebrae.

DR. ELLEN PATTERSON: Do these spurs correspond to spurs of the bones of the feet, due to infections?

DR. H. P. MOSHER (closing): I think these exostoses are arthritic in origin and due to chronic infection.

I do not think all these pouches are embryological. They may have to do with excess pressure. I wrote a paper on asymmetry of the esophagus in cases of pressure, where the pressure works on a weak spot. Dr. Cahill mentioned a case in which a thief was able to stuff something in a pharyngeal pouch and later spit it out. In Africa thieves develop an esophageal pouch to hide their booty. Dr. Jackson asked me why I did not present some new cause for cardiospasm, but we don't need it with this pinchcock affair. This thing has begun in the lower end of the esophagus, where it will end God knows; probably in the nose.

I am very much obliged to Dr. Forbes; he let me off very nicely.

Traumatic Perforation of the Esophagus. Dr. Henry Boylan Orton.

Anterior Dislocation of the Atlas as a Cause for Inability to Swallow Solid Foods. Dr. Henry Boylan Orton.

DISCUSSION.

DR. CHEVALIER JACKSON (Philadelphia): Dr. Orton's report adds emphasis to the importance of thorough Roentgen ray study preliminary to esophagoscopy. Our rule is never to pass the esophagoscope without such study. Dr. Ellen J. Patterson published a report of a number of cases showing how the trachea with an enlarged thymus in front and the esophagoscope behind is apt to be squeezed between the two, thus causing dyspnea in esophageal foreign body cases in babies, and she emphasized the importance of an X-ray study to see if enlarged thymus exists before esophagoscopy for foreign body. Dr. Orton has shown us that we should routinely study the spine before doing an esophagoscopy. It is even possible that an esophagoscopist might be accused of dislocating these spinal vertebrae. I think therefore that with aneurysm we have three very important clinical points for investigation before doing an esophagoscopy. We should resist pressure of the practitioner who wants to rush us into an esophagoscopy. We should insist on proper Roentgen ray study of the patient in every case, except in emergencies.

DR. S. YANKAUER (New York): I saw a parallel case to that of Dr. Orton; the patient was admitted to the hospital vomiting blood. He stated that a week previously he had swallowed a fish bone. The radiograph did not show any foreign body. One of my assistants esophagoscoped him and found an ulcer just below the aortic arch, which was bleeding. The bleeding stopped but the patient ran a temperature. Further X-ray study showed an increasing mass in the mediastinum. I thought the fish bone had perforated the esophagus and advised surgical exploration of the mediastinum. This was done; no abscess and no foreign body was found. The patient died and came to autopsy. This showed that the foreign body had perforated the esophagus and the ascending aorta causing an aneurysm between the aorta and the esophagus which began to suppurate. The foreign body was not found.

(a) Foreign Body Cases of Unusual Interest. (b) A New Method of Applying Radium to Carcinoma of the Esophagus and of the Cardia. Dr. Sidney Yankauer.

DISCUSSION.

DR. CHEVALIER JACKSON (Philadelphia): I am glad to hear Dr. Yankauer bring forward a matter which we feel should be emphasized every time we get the ear of the general practitioner. We teach the undergraduates at Jefferson and the graduates at the University of Pennsylvania that the Roentgen ray examination for foreign body should be made to include everything from the nasopharynx to the tuberosities of the ischia. An ordinary Roentgen ray examination of the chest will miss a foreign body in the hypopharynx, larynx, nasopharynx or gastrointestinal canal, which is in some cases a

matter of vital importance. I congratulate Dr. Yankauer on the successful removal. I am heartily in favor of prophylaxis, and the rule to close all safety pins is a good one.

DR. GEORGE F. KEIPER (Lafayette, Ind.): I want to second the suggestion of closing of safety pins after removal from babies' clothes, but we should use more prophylaxis than that. We should put all these things out of reach; not only pins, but everything else the child can get hold of.

DR. H. P. MOSHER (Boston): In regard to the open safety pin, half in the esophagus and half out, I am in sympathy with closing it if you can, but I think you should be ready to put your pride in your pocket, that is, cut the pin, and not persist in performing version of the pin. This advice applies especially to the younger men who have not the skill that comes from long experience. The old Casselbury cutter can be used in such cases. I am in sympathy with the propaganda suggested by Dr. Yankauer, but it seems to me that Dr. Yankauer has never been a mother and has never had to change a diaper quickly, if he insists that all safety pins should be closed.

DR. T. E. CARMODY (Denver): I think the propaganda is good and should be followed whether you have been a mother or not, but it is hard to teach men in class some of the things we think they ought to practice. I have been teaching them for years not to wet the finger in the mouth, to turn a chart, and when I am there they don't do it. One of the men told me I had broken him completely of the habit of wetting his finger; he says now he wets his thumb!

DR. D. CROSBY GREENE (Boston): In regard to the application of radium to the esophagus, if the applications are to be used, I think Dr. Yankauer's method is the safest, and I believe the radiographic method of Jackson is a good one, but personally I am skeptical of the end results. If you destroy the cancer you are in danger of causing serious effects. I do not believe we are ever going to cure cancer by radiation. It is only palliative. If the patients can be persuaded to have a gastrostomy done I think it is a good palliative measure. I have seen a number of cases and I am struck with the difference in the response in individual patients. One patient will live a year when nothing but gastrostomy has been done. The cancer may obstruct the lumen of the esophagus, yet the patient will live and retain weight. In another case gastrostomy was done and deep X-ray radiation. The esophagoscope was obstructed. The patient lived for a year; yet in other cases the duration of life has been only a few months.

DR. WOLFF FREUDENTHAL (New York): Regarding multiple foreign body cases, I recollect one case which was seen in the early days of bronchoscopy. The woman had swallowed a pin. I got it out easily, but soon she began to complain of pain again, and it was found she had pins in the stomach and bowels. It was discovered that she was insane and in the habit of swallowing foreign bodies.

Regarding the application of radium. This method seems to be feasible, but I believe that it must be extremely difficult to get the thread through the cardia with a good deal of carcinomatous tissue present. Does it not bleed very much?

DR. H. H. FORBES (New York): In regard to the X-ray pictures taken in our cases, wherever we have established bronchoscopic clinics in the hospitals, I believe it would be a good idea to have full instructions drawn up and printed, so that the picture would cover all the necessary features, including the thymus gland, and also that the possibility of an aneurysm impinging on the esophagus should be taken into consideration.

Bronchoscopy for house surgeon. Routine preparation of patient:

1. Full history and duplicate if possible in foreign body cases. X-rays if any.

2. Dyspneic cases: notify surgeon at once. Emergency tracheotomy set at bedside.

3. Indirect examination of all laryngeal cases when possible.

4. Physical examination for all cases, especially in reference to pulmonary t. b., aneurysm, thyroid and thymus. Internist to examine all doubtful cases except in emergency.

5. X-ray examinations when possible. Full instructions to be sent to X-ray laboratory; and a request for size of thymus gland in child. Possible foreign body in lung. Best when doubtful to cover neck and chest. The possibility of an aneurysm and an esophageal diverticulum must be kept in mind.

6. Water starvation. a. Hypodermoclysis; b. enteroclysis.

7. Mouth wash, 20 per cent alcohol, and remove artificial dentures. Wash face soap and water before going to operating room.

8. Dental defects necessary extraction to be done before admission to the hospital, when case is not emergency and this has not been given attention. A consultation slip may be sent to dentist.

9. When time permits to forestall vomiting: no food, 4 hours, bronchoscopy; no food, 6 hours, esophagoscopy; no food, 12 hours, gastroscopy.

10. Adults: preliminary hypo of morphin and atrophin, one hour before examination; ⅙ or ¼ morphin sulphate with atrophin sulphate gr. 1-150. Patient to remain in bed. To be brought to operating room in wheel chair. Dr. Henry Hall Forbes.

New York Post-Graduate Hospital, Dec. 1, 1923.

Bronchoscopy. Operating room:

1. Select instruments. a. Tubes and forceps; sterilize by boiling, clean inner tubes after boiling. b. Lamps and light carriers; alcohol, 95 per cent. c. Cables; wipe with alcohol.

2. Test instruments: battery, cables, pump, suction tubes and forceps.

3. Set up; cocain 10 per cent in green cup; cocain 20 per cent in red cup.

4. Emergency: Tracheotomy set. Extra lights and cable. Oxygen tank, amyl nitrate pearls. Fluoroscopic room.

5. Have X-rays and duplicate of foreign body when possible brought to operating room with patient.

6. Assistants. Operator. 1st assistant; instruments. 2nd assistant, hold head. Nurse; for suction. Anesthetist; to watch patient's condition.

7. Patient properly anesthetized; routine for adults. 1. Laryngoscopy, 10 per cent cocain application; 20 per cent if necessary. 2. Esophagoscopy, 10 per cent cocain application to laryngopharynx. Head covered, rubber cap. Neck free, possible tracheotomy. Patient covered with sterile sheet. Face wiped with 70 per cent alcohol. Regular operating room aseptic technique to be observed as far as possible.

8. Darkened room and silence.

9. Care of instruments. Tubes to be cleaned by forcing cold water through the drainage canals to clear blood and secretions. Gauze on sponge to clean and dry main canal and "pipe cleaner" for light canal. It is of utmost importance that instruments should be put away in good order. Best oil to use is "3 in 1." Dr. Henry Hall Forbes.

Dec. 1, 1923.

DR. WM. B. CHAMBERLIN (Cleveland, O.): I regard to the difficulty of getting a string through the cardia, which Dr. Freudenthal has mentioned, some time ago I saw a case of a child with lye stricture, who had had a previous gastrostomy. I got the string through the stricture by attaching it to a urethral bougie, recovering the bougie through the gastrostomy wound. I was struck with the difficulty of finding the bougie in the stomach. I thought it would be extremely easy to put a scope through the gastrostomy opening and find it, but I found it extremely difficult. I finally took an ordinary Kelly cystoscope and swept it round the circumference of the stomach. In my experience the finding of objects through a gastrostomy wound is a difficult matter.

DR. ELLEN PATTERSON: In regard to propaganda, I tell all parents to spread propaganda to all other parents with whom they come in contact, especially warning them as to the danger of aspirating peanuts. I believe that parents can spread more propaganda in this way than we can.

DR. S. YANKAUER (closing): I want to say that if I had been called in to see the child earlier, I should not have accepted the X-ray. I would have demanded an X-ray from the base of the skull to the anus. At present in this Society we should ask for one X-ray in inspiration and one in expiration.

Regarding the question of getting a string through the carcinoma at the cardia, there was only one case in which I was not able to get the patient to swallow the string. I pushed the string through with the esophagoscope. I think the filiform bougie would have got through. There was bleeding, but not alarming. The patients must take this risk. We must get the string through any way we can. It is not easy to find the string in the stomach, but it is easier with black string than with a white one. I think if the gastrostomy is made further to the left it is easier to find the string and to locate the cardiac opening of the stomach.

In regard to propaganda, no propaganda will prevent some children from swallowing open safety pins. We cannot prevent every child from swallowing or inhaling foreign bodies, but I think propaganda will prevent the enormous number of accidents by swallowing open safety pins. What I have particularly in mind is a propaganda against the open safety pin; let us teach everybody with whom we come in contact, by example as well as by precept, to close every safety pin which we see anywhere; never let an open safety pin lie around anywhere. We can in this way prevent some of them from being swallowed.

Presentation of X-ray of an Interesting Esophageal Distortion. Dr. H. H. Forbes.

DISCUSSION.

DR. CHEVALIER JACKSON: We have had two cases that I recall of preoperative, spontaneous, subcutaneous emphysema, without pneumothorax, both peanut kernel cases, both with obstructive emphysema. Dr. Manges thought there was rupture of the air vesicles and that the air had leaked into the mediastinum and thence into the tissues, due to the plus pressure of obstructive emphysema. The air goes in past the peanut kernel but cannot escape, resulting in a trapping of air in the lung, as first demonstrated by Iglauer. I think we should remember that subcutaneous emphysema is not always the result of instrumentation; though usually it is due to heavy instruments or heavy hands.

Report of a Case of Emphysema of the Neck and Chest (Preoperative), Following Inhalations of a Piece of a Nut. Dr. H. H. Forbes.

DISCUSSION.

DR. S. YANKAUER: Subcutaneous emphysema occasionally occurs in pneumonia where there is no question of foreign body; it is due to rupture of the pulmonary vesicle from excessive coughing.

DR. IMPERATORI: I recall a case of subcutaneous emphysema, occurring in a child, who had aspirated a tooth. The child was hit by a falling door and one of the canine teeth had been dislodged. Radiographs showed the tooth partially outside of the left bronchus, under the heart. Immediately following the accident there was an extensive emphysema of the neck, chest and abdomen.

Two attempts at removal were unsuccessful and the child died within two days. Autopsy showed the tooth, entirely without the bronchus and in the mediastinum. There was no pneumothorax.

Regarding the second case, I disagreed with Dr. Forbes and Dr. Heyd in thinking that this was a cardiospasm. It would seem that this was a congenital dilatation of the esophagus. The radiographs show stricture and kinking of the esophagus.

DR. H. P. MOSHER: In regard to this case of Dr. Forbes, followed by Dr. Imperatori, I was going to object to cardiospasm. I think there was stricture. I thought it would be low down near the gall bladder, but Dr. Imperatori found the stricture higher. I think these cases are stricture, but they are also twists. In one case, a woman, age 50 years, with

a long gastric history, I asked the operator if he could find a stricture, but instead there was a twist.

DR. L. W. DEAN: Do they twist, then untwist, then twist again?

DR. MOSHER: I think the twist is the same all the time.

DR. IMPERATORI: The instrument used was the mechanical dilator of Dr. Mosher.

DR. D. CROSBY GREENE: In one case where there was no difficulty in passing the scope into the stomach, the patient had just as much difficulty in swallowing after, as before, exploration. She had an appendix operation and I asked the surgeon to explore the region of the cardiac orifice for adhesions from an old inflammatory process, in line with Dr. Mosher's idea as to the cause of stricture. The surgeon found adhesions in the vicinity of the cardiac orifice, which he manipulated. Following that the patient has swallowed better and has continued improving for three years. I think in this case the pathology outside of the esophagus is responsible for the difficulty.

DR. S. YANKAUER: I was wondering whether the case that Dr. Imperatori presented was one of the rare and peculiar cases where there is thoracic displacement of the stomach.

Phantom Foreign Body of the Larynx. Dr. Mervin C. Myerson.

Obscure Chest Conditions with Positive Bronchoscopic Findings, Including Two Cases of Syphilis of the Trachea and Bronchi. Dr. Mervin C. Myerson.

DISCUSSION.

DR. WM. B. CHAMBERLIN: In regard to fistula, I was able to see, through the courtesy of Dr. Warren Tuckerman, an interesting case, which I will report briefly. The patient had violent attacks of coughing immediately after eating. An X-ray of the chest was made, and with bismuth in situ we obtained a picture of the entire bronchial tree. Subsequent bronchoscopic examination of the patient showed a fistula between the esophagus and the left main stem bronchus. One could see the fistula very plainly; it was quite evident. The patient was fed for a number of months through a tube and ultimately made a complete recovery. You can imagine our astonishment in this case to find a complete outline of the bronchial tree in the X-ray picture.

DR. ISAAC KELLY: I was asked to see a case recently; the patient was a boy, age 10 years, who had coughed excessively for ten days. The cough could only be stopped by pressure at the suprasternal notch. The child had ulceration of the skin from the constant pressure, but the moment the finger was removed the cough began. If he could hold his breath for a moment, he could stop the cough. He had been given all kinds of sedatives without avail. The chest showed a slight broncho-pneumonia. There was no indication of a foreign body. We thought it advisable to do a bronchoscopy. We found the tracheobronchial tree normal except for congestion. I tried to cocainize the larynx and trachea, but unsuccessfully. He continued to use the pressure method of stopping the cough. The next day the boy died. We had a very careful autopsy done. There was no finding except broncho-pneumonia. The thymus was normal. The case was a complete puzzle to me. I would like to know if anyone could suggest an explanation.

DR. MYERSON (closing): I do not feel competent to give an explanation of the case cited by Dr. Kelly, but would call attention to the fact that we do not use cocain any more in the larynx of children.

History Chart for Bronchoscopic Clinic as Used at Manhattan Eye, Ear and Throat Hospital, New York. Dr. Charles J. Imperatori.

Foreign Body Introduced Transpleurally and Removed via Bronchus, Three Years Later. Dr. Charles J. Imperatori.

Foreign Body Removed from the Bronchus After Being in Situ Over Three Years. Dr. Charles J. Imperatori.

Tracheotomy: Improved Technique. Dr. Elbyrne G. Gill.

The Bronchoscope as an Invaluable Aid for the Performance of Tracheotomy in a Certain Class of Cases. Dr. Fielding O. Lewis.

DISCUSSION.

DR. E. G. GILL: I employed this technique for the first time in 1922. While I do not claim priority in its use, I think this method has fallen more or less into disuse. My own excuse for mentioning it here is that it might become more generally used. It renders what is sometimes a very difficult operation a simple and safe procedure. In children, or adults, who have short, fat necks, tracheotomy is a very difficult procedure. By first introducing the bronchoscope and allowing it to remain in the trachea, you have a definite landmark and you have provided sufficient breathing space. You have thereby eliminated the possibility of asphyxiation. My experience in this technique is that it should be used as a routine measure whenever a tracheotomy is indicated. In the hands of one who is familiar with the use of the bronchoscope there cannot possibly be any unfavorable complications. Dr. Jackson states we should always be prepared to perform a tracheotomy whenever called upon to perform a bronchoscopy. I feel that we should always be equally prepared to do a bronchoscopy whenever called upon to do a tracheotomy.

DR. HARRIS P. MOSHER: I do not know why this procedure should be considered new in Philadelphia. I do not know where they have been if they have not heard of it.

DR. WOLFF FREUDENTHAL: Some years ago I had a bronchoscopic set with me on an occasion when for some reason or another I found it necessary to do a tracheotomy. I found out how easy it was to do tracheotomy combined with bronchoscopy. I am grateful to Dr. Lewis for bringing up this subject. It is quite a different matter to treat a patient with dyspnea in a hospital where you have all your instruments at hand, and another and very unpleasant thing to have a patient with dyspnea in the office when the hospital is not nearby. I had a woman come to my office with dyspnea to such a degree that I could hear her heavy breathing as soon as she entered my waiting room. Such cases keep one on the *qui vive*. In this case the dyspnea occurred right after child birth. I found that the arytenoids were edematous and the vocal cords moved very little. I have seen other cases where this occurred postpartum. To go into the trachea with a bronchoscope in such a case would be very difficult. I told this patient that she ought to be tracheotomized at once, but she would not consent to this. She turned up after three, five and six weeks. When I asked her how she felt, she would say she felt fine (but with a terrible croak). One night I was called up and they told me the woman was cyanotic. She was some distance away, and I told them to go to the nearest physician and have a tracheotomy done.

Another case occurred in a physician, a laryngologist besides, which made it worse. He had difficulty in breathing and a temperature of 103.° The right arytenoid was swollen and edematous and back of the middle turbinate body there was a great deal of pus. I advised him to go to the hospital for tracheotomy, but he would not have it done. He was better next day and I saw pus coming from the right arytenoid and posterior pharynx. The next day there was a marked swelling and evidence of pus outside on the neck. I wanted to make an incision, as there was severe dyspnea, but he refused and got better! We would not have been able to go through the larynx and do a bronchoscopy here. These are, fortunately, rare cases in which the condition would not have been relieved, excepting by tracheotomy.

DR. MANDELBAUM: I think it is dangerous to claim priority in this technique. The method came to my attention in February. I was called to see a patient, a child, who was choking to death. The child was very dyspneic. I had no instruments with me, but there was a doctor in the house who went down to his office and got a scalpel and artery clamps, also a vesical trocar and canula. I thought the child was dead. I hastily hooked my finger in the child's throat and withdrew the trocar from the end of the canula. I slipped the trocar between the vocal cords and

withdrew it with a pharyngoscope. Then I put the canula into the wound. I sent to my office for a Jackson tracheotomy tube. I have made a crude model of this instrument. I have called it reverse tracheotomy. Hearing of this method, I thought I would refer to this apparatus now. In the canula I am having made the instrument is curved, flat, with a short, sharp bystery concealed. The end is blunt. It can be pushed down between the vocal cords. When the blunt end is in place in the front wall of the trachea you push your tube through. This can be used in cases of edema of the larynx, multiple polyp, or carcinoma.

DR. H. P. MOSHER: I would like to know why you do not push the trocar into the trachea. Why do you go by the cords?

DR. L. W. DEAN: I would not approve resorting to bronchoscopy as a routine measure in tracheotomy. Our results from emergency tracheotomy without bronchoscopy have been very satisfactory. I feel that if bronchoscopy is resorted to as a routine procedure, especially by the younger men, we may have some serious results.

DR. MCGINNIS: I feel with Dr. Lewis that in doing tracheotomy very often that we meet cases where the trachea is hard to outline and we want something inside of the trachea as a guide. I have used the Mosher Laryngeal Speculum and put in an intubation tube, and then did tracheotomy on the intubation tube.

DR. CLERF: At the Bronchoscopic Clinic we have had occasion to utilize this method of tracheotomy in selected cases. I was glad to hear Dr. Dean sound a note of warning. Unless one has at hand, ready for use, all of the apparatus necessary for the successful and immediate introduction of a bronchoscope, it would probably be safer to do the emergency tracheotomy without the aid of a bronchoscopic guide. In the case presented by Dr. Lewis there was no need for haste; instead, the tracheotomy was a deliberate and orderly procedure and the complications were effectively dealt with. It would seem well to precede tracheotomy by bronchoscopy in cases of tracheal displacement, in new growths involving the trachea, the thyroid gland or other peritracheal structures and in cicatricial stenosis of the trachea.

DR. WM. B. CHAMBERLIN: I cannot see the danger to which Dr. Dean called attention. I think tracheotomy is looked upon as a simple procedure, and it is in many cases. Perhaps I am unusually awkward. In some cases I have found difficulty in locating the trachea, especially in small children with a short, fat neck. If the assistant deviates the head to one side or the other it is easy to go to one side or the other of the trachea and thus get behind the trachea. In certain cases this procedure would be very valuable. I recall a case which I saw some time ago. The child was the only boy of a practicing physician. He was brought in to the clinic at 8 o'clock, suffering from a sudden marked dyspnea. The father could not account of this except under the supposition that there might be a foreign body in the larynx. I had an excellent assistant. I started to do a bronchoscopy, but the child suddenly stopped breathing on the table and before we could get the tube in the child was dead. The father was very anxious to find the cause of this sudden dyspnea, because the child had been apparently in perfect health. At autopsy we found a tremendous edema of the glottis. The determining factor in my mind was in allowing the child to lie down on the operating table. There was extreme difficulty in breathing, but no marked cyanosis. As soon as the child was laid down, breathing stopped and we were unable to introduce the bronchoscope through the edematous glottis. Before we could do it the child was dead.

To be Continued.